

Carleton University

Faculty of Graduate Studies
and Research

1981-82
Calendar







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and Research
1981-82
Calendar

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Dean of Graduate Studies and Research
To be announced

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R.G. Laird

Office Hours
September 1 to April 30
9:00 a.m. to 12:00 noon
1:00 p.m. to 5:00 p.m.

May 1 to August 31
8:30 a.m. to 12:00 noon
1:00 p.m. to 4:30 p.m.

As this calendar is published several months before the opening of the session, the University reserves the right to make whatever changes circumstances may require, including cancellation of particular courses.

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Carleton University

Ottawa, the capital of Canada, is a medium-sized, non-industrial city located at the junction of the Ottawa, Gatineau and Rideau rivers. Excellent skiing facilities, water recreation areas, and scenic areas are located in the Gatineau Hills a few minutes away from the campus. The National Arts Centre with its own orchestra, the National Gallery of Canada, and other such institutions give the city a well-rounded cultural environment. Entertainment is available in both of Canada's official languages, French and English.

Carleton is a university old enough to have an established reputation, yet young enough to combine its tradition with innovation in ways to meet the diverse needs of modern students.

Founded in 1942 as a non-denominational, private and co-educational college, Carleton initially occupied scattered rented quarters in downtown Ottawa, but by 1946 it had moved to a permanent building in central Ottawa. As the University expanded, it became necessary to plan and develop a new campus located on a large and picturesque site between the Rideau River and the Rideau Canal.

The University awarded its first degrees in 1946, but it did not offer programs of graduate studies until 1954. Carleton's first undergraduate degrees, awarded in 1946, were in journalism and in public administration; its first graduate diploma in 1954 was in public administration. By now, 27 years after the beginnings of its graduate studies, the University also offers graduate instruction leading to the Master's degree in some 32 areas and to the doctorate in 15 fields. In 1980-81, Carleton registered 926 full-time graduate students. In addition, 837 students were registered for part-time graduate studies.

Carleton has set as its major goals in graduate studies the promotion of a spirit of independent investigation and the pursuit of scholarly work of consistently high quality. By concentrating on certain fields of studies to the exclusion of others and by electing areas in which it had a comparative advantage, the University has been able to ensure a great measure of success in the pursuit of these goals.

Carleton University has a good base of operation at the graduate level: outstanding scholars, challenging and imaginative programs of studies, students of high quality, libraries, laboratories and other research facilities. Moreover, the location of the University in the capital of Canada also enables graduate students to have access to the vast number of scholars working in government organizations and departments, and to take advantage of research and library facilities associated with these national institutions.

Degree Programs

The following graduate programs are currently offered at Carleton:

Graduate Diploma in Public Administration (D.P.A.)

Master of Arts (M.A.)

In Anthropology, Canadian Studies, Classics, Comparative Literature, Economics, English, French, Geography, German, History, International Affairs, Philosophy, Political Science, Psychology, Public Administration, Religion, Spanish, Sociology, and Soviet and East European Studies

Master of Engineering (M.Eng.)

In Aeronautical, Civil, Electrical, Mechanical, and Materials Engineering

Master of Journalism (M.J.)

Master of Science (M.Sc.)

In Biology, Chemistry, Geology, Information and Systems Science, Mathematics, and Physics

Master of Social Work (M.S.W.)

Doctor of Philosophy (Ph.D.)

In Biology, Canadian Literature, Chemistry, Economics, Engineering (Aeronautical, Civil, Electrical, and Mechanical), Geology, History, Mathematics, Physics, Political Science, Psychology, and Sociology

Academic Dress

The academic dress of Carleton University is a compromise between the style of hoods outlined in the American Intercollegiate Code and the dress of the ancient foundations of Britain and America.

The Master's hood, made of black silk, is of simple or Oxford shape with an open lining of two chevrons (red and black) on a silver field. The border of the hood denotes the degree granted, according to the following colour combinations: Arts — white; Journalism — white with a black cord sewn slightly in from the lower border; Science — golden yellow; Social Work — cream; Engineering — orange. The Master's gown is of full style, made of black silk or rayon, with full gathered yoke behind and closed sleeves with an opening at the elbows.

The Doctor of Philosophy hood is also made of silk, but completely opened to show the lining, and provided with a purple border. The doctoral gown has the same style as the Master's and is made of royal blue cloth with facings of light blue silk.

The gown of the Honorary Doctorate of Laws, of Science, or of Engineering is a blue robe with bell-shaped sleeves, made of fine royal blue cloth with facings and sleeves in light blue silk. The hood is made of the same material as the gown, has the same lining as that for the degrees granted by examination, and is bordered with purple for the degree of Doctor of Laws, dark red for the degree of Doctor of Science, and orange for the degree of Doctor of Engineering.

The following schedule of dates is anticipated for academic activities and procedures; however, it is subject to final confirmation by the University Senate.

Spring Term and Summer Session 1981

May 13, 14

Registration for spring term.

May 18

Statutory holiday, University closed.

May 19

Spring term classes begin.

May 26

Last day for late registration for spring term.

Last day for spring term course changes.

June

Spring Convocation for the conferring of degrees; date to be announced.

July 1

Statutory holiday, University closed.

July 2

Registration for summer session day division.

July 3

Summer session day classes begin.

July 8

Last day for late registration for summer session.

Last day for summer session course changes.

August 3

Civic holiday, University closed.

August 12

Last day for spring term and summer session classes. Last day for withdrawal from spring term and summer session courses.

August 13-15

Spring term and summer session examinations.

Fall Term 1981

June 2

Last day for the receipt of applications for fall term registration from candidates whose documents originate outside Canada. Supporting documents (transcripts, letters of reference, etc.) must be received by June 30. Applications from candidates in this category who intend to register initially for the winter term must be received by October 2, and for the spring term by February 2.

August 14

Last day for receipt of applications for fall term registration from candidates resident in Canada. Supporting documents (transcripts, letters of reference, etc.) must be received by September 4. Applications from candidates resident in Canada who intend to register initially for the winter term must be received by November 6; and for the spring term by April 1.

September 7

Statutory holiday, University closed.

September

Registration of graduate students for the fall and winter terms; dates to be announced.

September 8

Classes begin in all courses.

September 15

Last day for submission to the thesis supervisor of four examination copies of the Master's and Ph.D. theses for Fall Convocation. Last day for receiving applications for degrees from potential graduates for Fall Convocation.

September 18

Last day for late registration for fall term. Last day for course changes for full courses and fall term half-courses.

October 12

Statutory holiday, University closed.

October 15

Last day for submission to the Graduate Studies and Research Office of four final copies of Master's and Ph.D. theses for Fall Convocation.

November

Fall Convocation for the conferring of degrees; date to be announced.

December 4

Last day for fall term classes. Last day for withdrawal from fall term half-courses.

December 5-19

Mid-year examinations, including half-course finals, may be scheduled as announced.

Winter Term 1982

January

Registration for winter term; dates to be announced.

January 4

Winter term classes begin.

January 15

Last day for course changes for winter term half-courses. Last day for late registration for winter term.

February 23-27

Study period.

March 2

Last day for receipt of applications for admission from candidates who wish to be considered for the initial award (April 1) of financial assistance (including Carleton fellowships, scholarships and departmental assistantships) administered by Carleton University. Supporting documents (transcripts, letters of reference, etc.) must be received by March 13. Candidates whose applications are received after the March 2 deadline date may be eligible for the award of a fellowship, scholarship, or assistantship by reversion. Awards by reversion are normally considered on or about May 15, August 15 and October 1.

March 15

Last day for receiving applications for degrees from potential graduates for Spring Convocation.

April 3

Last day for submission to the thesis supervisor of four examination copies of the Master's and Ph.D. theses for Spring Convocation.

April 8

Last day for winter term classes. Last day for withdrawal from full courses and winter term half-courses.

April 14-May 1

Final examinations may be scheduled as announced.

April 9

Statutory holiday, University closed.

April 30

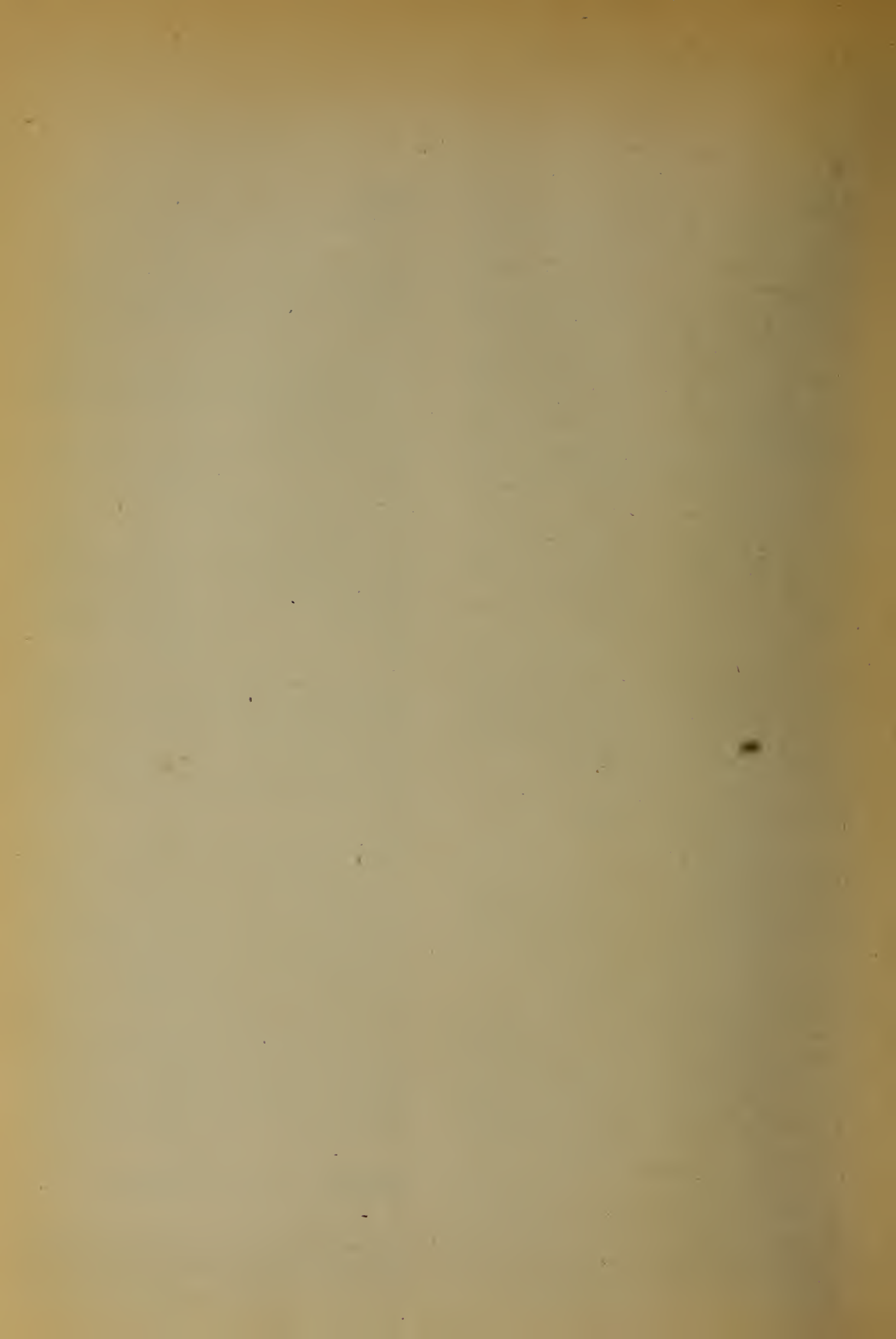
Last day for submission to the Graduate Studies Office of four final copies of Master's and Ph.D. theses for 1982 Spring Convocation.

1981

S	M	T	W	T	F	S	S	M	T	W	T	F	S
January							February						
				1	2	3	1	2	3	4	5	6	7
4	5	6	7	8	9	10	8	9	10	11	12	13	14
11	12	13	14	15	16	17	15	16	17	18	19	20	21
18	19	20	21	22	23	24	22	23	24	25	26	27	28
25	26	27	28	29	30	31							
March							April						
1	2	3	4	5	6	7				1	2	3	4
8	9	10	11	12	13	14	5	6	7	8	9	10	11
15	16	17	18	19	20	21	12	13	14	15	16	17	18
22	23	24	25	26	27	28	19	20	21	22	23	24	25
29	30	31					26	27	28	29	30		
May							June						
				1	2		1	2	3	4	5	6	
3	4	5	6	7	8	9	7	8	9	10	11	12	13
10	11	12	13	14	15	16	14	15	16	17	18	19	20
17	18	19	20	21	22	23	21	22	23	24	25	26	27
24	25	26	27	28	29	30	28	29	30				
31													
July							August						
			1	2	3	4							1
5	6	7	8	9	10	11	2	3	4	5	6	7	8
12	13	14	15	16	17	18	9	10	11	12	13	14	15
19	20	21	22	23	24	25	16	17	18	19	20	21	22
26	27	28	29	30	31		23	24	25	26	27	28	29
							30	31					
September							October						
		1	2	3	4	5				1	2	3	
6	7	8	9	10	11	12	4	5	6	7	8	9	10
13	14	15	16	17	18	19	11	12	13	14	15	16	17
20	21	22	23	24	25	26	18	19	20	21	22	23	24
27	28	29	30				25	26	27	28	29	30	31
November							December						
1	2	3	4	5	6	7		1	2	3	4	5	
8	9	10	11	12	13	14	6	7	8	9	10	11	12
15	16	17	18	19	20	21	13	14	15	16	17	18	19
22	23	24	25	26	27	28	20	21	22	23	24	25	26
29	30						27	28	29	30	31		

1982

S	M	T	W	T	F	S	S	M	T	W	T	F	S
January							February						
				1	2					1	2	3	4
3	4	5	6	7	8	9	7	8	9	10	11	12	13
10	11	12	13	14	15	16	14	15	16	17	18	19	20
17	18	19	20	21	22	23	21	22	23	24	25	26	27
24	25	26	27	28	29	30	28						
31													
March							April						
		1	2	3	4	5					1	2	3
7	8	9	10	11	12	13	4	5	6	7	8	9	10
14	15	16	17	18	19	20	11	12	13	14	15	16	17
21	22	23	24	25	26	27	18	19	20	21	22	23	24
28	29	30	31				25	26	27	28	29	30	
May							June						
					1				1	2	3	4	5
2	3	4	5	6	7	8	6	7	8	9	10	11	12
9	10	11	12	13	14	15	13	14	15	16	17	18	19
16	17	18	19	20	21	22	20	21	22	23	24	25	26
23	24	25	26	27	28	29	27	28	29	30			
30	31												
July							August						
			1	2	3		1	2	3	4	5	6	7
4	5	6	7	8	9	10	8	9	10	11	12	13	14
11	12	13	14	15	16	17	15	16	17	18	19	20	21
18	19	20	21	22	23	24	22	23	24	25	26	27	28
25	26	27	28	29	30	31	29	30	31				
September							October						
		1	2	3	4						1	2	
5	6	7	8	9	10	11	3	4	5	6	7	8	9
12	13	14	15	16	17	18	10	11	12	13	14	15	16
19	20	21	22	23	24	25	17	18	19	20	21	22	23
26	27	28	29	30			24	25	26	27	28	29	30
November							December						
1	2	3	4	5	6					1	2	3	4
7	8	9	10	11	12	13	5	6	7	8	9	10	11
14	15	16	17	18	19	20	12	13	14	15	16	17	18
21	22	23	24	25	26	27	19	20	21	22	23	24	25
28	29	30					26	27	28	29	30	31	



Admission Requirements

Graduates of recognized universities, with at least second-class standing, will be considered for admission to the Faculty of Graduate Studies and Research. The University's general policy on admission is outlined below, but all applicants should refer to the departmental statements in this calendar for details concerning the specific or additional requirements of each department, institute, or school.

A combination of factors is taken into consideration in assessing the eligibility of a candidate for admission into one of the graduate programs:

- The performance of the candidate and the assessment provided by his/her referees as a measure of the likelihood that the candidate can successfully complete the course of studies and research defined by the Senate of the University for the given degree
- The capacity of the graduate department, institute or school to provide a program of studies and research which would meet the expectations of the candidate as defined in his/her statement of academic interests and ambitions
- The availability of a faculty member competent to supervise the academic program of studies and research of the candidate at the time.

Qualifying Year Program

Applicants who do not qualify for direct admission to the Master's program may be admitted to a Qualifying Year program. Applicants who lack an Honours degree, but have a pass degree with second-class standing (at least B overall) will normally be admitted to a Qualifying Year program.

If successful in this Qualifying Year, they may eventually proceed to the Master's program. However, admission to the Qualifying Year program does not imply automatic admission to the Master's program. At the end of the Qualifying Year program, the department will determine the student's eligibility to enter the Master's program, and the student will be informed of this decision by the dean of the Faculty of Graduate Studies and Research.

Applicants for a Master's degree who have a program requirement of seven and a half full courses or more (with the exception of Social

Work and Public Administration) will register initially in the Qualifying Year program.

Master's Program

For admission to the Master's program, applicants must hold an Honours bachelor's degree, or the equivalent, with at least high second-class standing (B+ or better in Honours subject; B- or better overall). The applicant must also be recommended by the department in which he/she plans to undertake his/her studies.

Applicants for a Master's degree who have a program requirement of seven full courses or less will register directly in the Master's program.

Doctoral Program

For admission to the Ph.D. program, applicants must ordinarily hold a Master's degree from a recognized university, with at least high second-class standing (B+ or better in Honours subject; B- or better overall).

Applicants should note that of the Bachelor's, Master's, and Ph.D. degrees, only two may ordinarily be taken at Carleton University.

Application for Admission

Applications for admission to the Faculty of Graduate Studies and Research should be made on prescribed forms, available from the major department or the Graduate Studies and Research Office, and they should be submitted directly to the department.

Deadlines

Candidates whose documents originate outside Canada must apply by June 2. All other applications must be received no later than August 14.

Applicants wishing to be considered for financial assistance from Carleton University are reminded that they must submit their completed applications for admission by March 13.

Transcripts

Two detailed *official* transcripts of the applicant's entire university record must be sent to the chairman of the department concerned.

Letters of Reference

All applications must be supported by letters of recommendation from at least two faculty members with whom the candidate has studied, who are in a position to assess his/her potential for graduate studies and research. References from non-academic supervisors are not ordinarily acceptable, except in certain cases, such as that of an applicant working in a research laboratory environment. All letters of reference are to be sent by the referees directly to the chairman of the department.

Proficiency in English

Proficiency in English usage is considered necessary to pursue graduate studies at Carleton University. Applicants whose native tongue is not English should be tested for proficiency in the English language. Tests are administered by TOEFL, Box 899, Princeton, N.J. 08540, U.S.A.

Admissions Procedure

All applications for admission will initially be examined and evaluated by the department, institute, or school in which the applicant wishes to study. All supporting documents (transcripts, letters of reference, etc.) must be received before any application can receive formal consideration.

Completed applications of those students whom the department wishes to recommend for admission will be forwarded to the dean of the Faculty of Graduate Studies and Research for consideration. The dean's office will officially notify each applicant whose admission is approved.

The Statement of Standing on Admission issued to each newly-admitted student is valid only for the 12-month period stipulated on the form. If the applicants fails to register within this period of time, his/her admission and registration eligibility will lapse automatically. He/she may re-apply for admission.

Program Requirements

As part of the learning experience at Carleton, all graduate students are expected to take an active part in the teaching and/or research activities of the unit in which they are registered, either by serving as an assistant, a demonstrator, or by undertaking independent research related to the research effort of the department, under the direction of their supervisors.

A description of each program offered under the auspices of the Faculty of Graduate Studies and Research is presented in the departmental program descriptions and details of courses section of this calendar. Prospective applicants should note particularly the admission requirements, the fields in which advanced study and research may be undertaken, and the program requirements of each department, in addition to the general regulations of the Faculty of Graduate Studies and Research, which are spelled out in this section.

Qualifying Year Program

Students in the Qualifying Year will ordinarily register in five full courses (or the equivalent) at the senior undergraduate level. Of these five, no more than one course at the 200 level and no more than two at the 500 level may be taken.

Master's Program

The normal requirement for the Master's degree is five full courses, or the equivalent, of which at least four (including the thesis where applicable) must be at the 500 level. With departmental approval, the remaining one course may be selected from those offered at the senior undergraduate level, that is, at the 400 level.

Doctoral Program

The period of formal study and research required in the Ph.D. program will normally be at least two years of full-time study (or the equivalent) beyond the Master's level.

The thesis will ordinarily carry a weight of about half of the total requirement of 10 full courses or the equivalent.

Ordinarily, all courses taken for credit towards the Ph.D. degree must be at the 500 or 600 level.

Transfer of Credit on Admission

Graduate courses completed at another institution may be accepted in partial fulfilment of Carleton's degree requirements.

Credit for such work will be determined in each case by the Executive Committee of the Faculty of Graduate Studies and Research, on the recommendation of the department concerned. Master's candidates are allowed a maximum of two transferred full course credits. In addition, if a Master's candidate is granted transfer credit for two full courses, his/her remaining three courses at Carleton must be at the 500 level.

Doctoral candidates may be given up to one year's credit for work completed at other universities, but must normally register for a minimum of one year of full-time studies thereafter at Carleton, and fulfil the thesis and comprehensive examination requirements. Students admitted with transfer of credits in a Ph.D. program may be required to pass a qualifying examination upon entry.

A candidate who has completed courses as a special student is not normally permitted to transfer such courses for degree credit in the Faculty of Graduate Studies and Research.

Transfer of Credit After Admission

A student formally admitted, and eligible to register in a graduate program, is not permitted to register at Carleton University at the same time in any other graduate program or as an undergraduate or special student. Should he/she do so, credits may not be transferred.

Similarly, if a student, formally admitted to a graduate program at Carleton (but not yet registered), wishes to enrol in courses at another university, credit will be granted only if written permission is received from the dean of graduate studies and research. Such permission must be received in advance of registration for the course work. *In no case will such transfer alter the maximum number of allowable transferred credits noted above.*

Language Requirements

Some graduate programs require a reading knowledge of one or more languages other than English. Language requirements will be prescribed by departments according to their regulations and the needs of their students.

Registration and Course Selection

The Faculty of Graduate Studies and Research divides the calendar year into three terms, and the academic year (September-May) into two terms; each term comprises about 13 weeks of lectures or seminars. The first term of the academic year is designated as the *fall term* (registration period at the beginning of September); the second term of the academic year is designated as the *winter term* (registration period early in January). The third term of the calendar year is designated as the *spring term* (registration period in late May). Graduate and senior undergraduate courses are also offered in the *summer session*, (registration period early in July) which comprises approximately six weeks of lectures or seminars. The precise dates of registration for the fall, winter and spring terms and for the summer session are specified in the academic schedule of this calendar.

All students enrolling at Carleton are required to register in their programs at designated times prior to the beginning of classes. They will initiate their registration procedures in their major department, from whom information concerning all phases of registration will be available.

Graduate students must have *written approval* from their departmental supervisor of graduate studies for initial course/program registration, and for any subsequent course changes. This approval is also required for any undergraduate student who wishes to register in a graduate-level course.

Credit will be granted only for those courses and research activities for which the candidate is formally registered. An unregistered student is not entitled to attend lectures, tutorials, or seminars, and is not entitled to thesis supervision, examination privileges, or access to research facilities. A student will receive no credit for any work completed during a term in which he/she was not properly registered.

Course Selection

A student proceeding to a graduate degree or diploma must arrange his/her program according to the regulations of the Faculty of Graduate Studies and Research and the major department.

The course and thesis requirements of each graduate program are organized or defined in units of full course credits. A full course credit typically comprises three hours of lectures or seminars a week for two terms, or the equivalent. A half-course credit typically comprises three hours of lectures or seminars a week for one term, or the equivalent.

Course Numbering System

Each course is identified by a seven-symbol code. The first two digits indicate the department, school, or committee under whose auspices the course is offered; the three digits following the decimal point identify the specific course; the letter which follows the course number designates the term in which the course is offered: for example, F: fall term, W: winter term, S: spring term, and T: two terms (fall and winter or winter and spring, etc.). The number which follows the letter indicates the credit weight of the course: 1 denotes one half-course credit, 2 denotes one full course credit, etc.

Status

A full-time graduate student will normally register in a minimum of three half-courses (or the equivalent) per term.

Part-time students are permitted to enrol in a maximum of two half-courses per term.

All students are reminded that status is established only by formal registration in the appropriate courses for each term of activity in the calendar year.

Whether a student registers on a full- or part-time basis in the thesis, research essay, or independent research project is determined by the amount of time devoted to graduate studies and research, and the demands on university personnel, resources and facilities.

Definition of Full-time Study

In addition to the *course load* requirements described above, the following criteria for full-time status have been established by the Ontario Ministry of Colleges and Universities:

- Students must identify themselves as full-time students; that is, they must so register during each term of activity.

- Students must be geographically available and visit the campus regularly; they may not be absent from campus without permission for a period exceeding four weeks in any term. Students wishing to undertake full-time studies off campus must secure, in advance, the written permission of the departmental chairman and the dean of graduate studies and research. (See Off-Campus Research)
- A full-time graduate student may not be regularly employed on work not directly related to his/her program for more than an average of 10 hours per week during any period of full-time registration.

Off-Campus Research

In the interest of enriching their learning experience, graduate students may arrange to undertake full-time studies or research at another institution or in the field. It should be understood that such activity would apply only to a part of the total program and that the off-campus period would not normally exceed 12 months.

Requests for permission to undertake full-time off-campus study or research must be submitted, well in advance, to the dean of graduate studies and research, through the department concerned. Such requests should include the following information:

- A detailed statement of the research proposal or program of studies, and the specific arrangements that are proposed for the supervision and direction of the work
- An explanation of the reasons why the work cannot be satisfactorily undertaken while on campus at Carleton
- A description of the studies and/or research facilities that are available at the proposed off-campus location
- A written statement from a responsible official (for example, the on-site supervisor or director) of the outside institution, confirming that the proposed arrangements are satisfactory and that the candidate will be able to undertake research or studies
- A time schedule for the proposed studies or research work
- A statement of the candidate's expected sources of financial support.

Inter-University Co-operation in Graduate Instruction

Under certain circumstances, it is permissible for a student admitted to a graduate degree program and registered at one Ontario university to follow an approved credit course at another university. All interested students should consult the chairman of their department, prior to registration, in order to obtain further information on procedures and conditions of eligibility.

University of Ottawa

Through a reciprocal agreement, a graduate student registered at Carleton University may be permitted to follow *up to two full courses* at the University of Ottawa. Moreover, there are reciprocal arrangements worked out among departments, institutes and schools at both universities to involve students, when it is desirable, in parts of the program of research and studies at the other institution. All interested students should consult the chairman of their department, institute or school, prior to registration, in order to obtain further information on particular departmental conditions of eligibility and procedures.

Continuous Registration

Any candidate who remains unregistered in his/her degree program for three terms (12 months) will lose his/her graduate status.

Continuous Registration in Thesis, Research Essay, or Independent Research Project

Any candidate (full-time or part-time), after initial registration in a thesis, research essay, or independent research project, must maintain this registration in all successive terms (including the term in which the student is examined), until his/her thesis, research essay, or independent research project is completed. Completion means modifications, any retyping involved, etc. In the case of a thesis, registration must be maintained until four (or five) final copies are deposited in the Graduate Studies and Research Office.

Students should note that faculty approval to register in the thesis, etc., is given on the understanding that the student will be in regular contact

with his/her supervisor, and that thesis research will be actively pursued in each term of registration.

Registration by mail is acceptable for part-time students in theses, etc., provided that the prescribed form is completed and returned (through the department concerned) together with fee payment (cheque or money order) before the last date for course changes in each term.

The per-term fee for part-time re-registration in theses, etc. is equivalent to the prevailing fee assessment for a half-course.

Thesis Registration Assessment of Part-time Students

Students who elect to complete their theses on a part-time basis will be assessed prorated fees that reflect the credit weight of their theses. For example, a student enrolled in a Ph.D. thesis, worth six credits, will be assessed a fee equivalent to one full course *per term* for the first six terms in which he/she registers in the thesis as a part-time student. Thereafter, the fee for re-registration is equivalent to the prevailing fee assessment for a half-course.

Off-Campus Registration

Students who have been permitted to study off campus, while registered full-time at Carleton, may register by mail. Registration forms may be obtained from the Graduate Studies and Research Office upon request.

Details of fees for students completing theses, etc., on a full-time basis, can be found on page 25.

Audit Courses

Graduate students may register to audit *one full course per program*. Full-time students will not be charged an additional fee; part-time students must pay the prevailing per-course fee.

Tutorials

These are arranged to allow students to take full advantage of all the resources of the University, even in areas or fields of a very highly specialized nature. Such arrangements are subject to the approval of the supervisor of graduate studies, who will arrange that a document spelling out the details of the topic, reading list, etc., is submitted

to the Faculty of Graduate Studies and Research before the last day for course changes in the term concerned.

Course Changes

A course change is the addition or deletion of one or more individual courses by a registered graduate student. This is the only acceptable procedure for revising or correcting a graduate student's registration. All course changes must be made on prescribed course change forms, which are available at the departmental offices or at the Graduate Studies and Research Office.

A part-time student who is registered in two courses and drops one of these may be entitled to a fee credit or refund, prorated from the date of withdrawal.

The deadline dates for course changes are stipulated in the academic schedule of this calendar.

Withdrawal

A graduate student wishing to terminate his/her registration in a graduate program (that is, drop all courses) must complete the prescribed withdrawal form (or apply in writing to the dean of graduate studies and research) and return his/her identity card.

When a student officially withdraws, with the approval of the dean of graduate studies and research, a refund of fees will be calculated on a pro rata basis as of the date of receipt of the withdrawal form (or letter) and the identity card. Credit for fees or refunds will depend on the date of withdrawal and the amount of fees paid.

Graduate students are cautioned that there is no procedure at Carleton University for direct "mid-term" transfer from one graduate program to another. Similarly, there can be no direct transfer to or from undergraduate or special student status. Any candidate who elects to change programs after registration (*before* the last day of late registration) will be required to withdraw from the first program and then register in the second. The pro rata refund of fees calculated as a result of withdrawal from the first program can be applied against the new fee assessment for the second program.

A registered candidate who completes his/her degree or diploma requirements prior to the last

day for withdrawal in any term (as specified in the academic schedule) is required to withdraw formally if he/she anticipates any refund of fees. A candidate whose degree program has been completed is not eligible for further registration in the Faculty of Graduate Studies and Research (unless he/she has been admitted to some other graduate program).

Exemption from Registration

Students who have valid reasons for not registering for a term may apply for permission to remain unregistered by:

- Writing to the dean of graduate studies and research stating the reasons for seeking exemption from registration
- Requesting a statement from the departmental supervisor of graduate studies (and from their thesis supervisor, if there is one) in support of their request, confirming that they will not be on campus for the term, will not use any University facilities (that is, library, laboratories, computer centre, etc.), or receive any supervision, including supervision through correspondence.

It is understood that such an exemption from registration will be granted only in exceptional cases (for example, medical or other special reasons).

Exemptions are normally granted for one term, but in extraordinary circumstances for a longer period.

Examinations

Final examinations in courses will be held at the times indicated in the academic schedule. Graduate students must obtain grades that meet the standards outlined in the academic standing section of this calendar, and that satisfy the specific requirements of the department concerned.

A graduate student who is unable to write a final examination because of illness or other circumstances beyond his/her control, or whose performance on the examination has been impaired by such circumstances, may apply to write a special or deferred final examination. Such an application will be considered only if it is submitted in writing

to the dean of graduate studies and research within two weeks of the examination.

If the student has been seen at the University Health Services, the dean's office will confirm the illness by contacting the treating physician. If the student has consulted a physician outside the University, he/she will be required to submit a statement (from the physician) confirming the illness.

In cases other than illness, appropriate documents will be required.

Supplemental or other grade-raising examinations are not permitted for students registered in the Faculty of Graduate Studies and Research. Graduate students may, however, with the permission of their department, repeat a course at the time of next regular offering to obtain higher standing.

Master's Examinations

In addition to any examination which may be required in individual courses, a Master's candidate who is writing a thesis will be expected to undertake either an oral defence of the thesis or a comprehensive examination in his field of specialization, or both. The thesis must be submitted, in examinable form, at least two weeks in advance of the thesis examination. When the degree is taken by course work, a comprehensive examination may be required. It is important to note that individual departments may have additional or particular requirements.

Doctoral Examinations

Doctoral candidates may be asked to pass a qualifying examination at the beginning of their residence at Carleton.

A comprehensive examination, covering prescribed fields, will normally be undertaken one year prior to the thesis presentation. This examination (oral or written, or both) may include any material considered fundamental to a proper comprehension of the field of study.

After the thesis has been received and accepted for examination, a final oral examination on the subject of the thesis and related fields will be held. Such thesis examinations will be scheduled upon receipt of theses, which must be submitted at least four weeks in advance of the date of the examination.

Comprehensive and Thesis Examinations

The date, place and time of comprehensive or thesis examinations will be announced at least two weeks in advance. An examining board will be appointed according to the guidelines laid down by the Faculty of Graduate Studies and Research.

If the comprehensive examination is graded *Unsatisfactory*, the department may permit the candidate to repeat the examination. If the comprehensive examination is graded unsatisfactory for a second time, a request by the department that the candidate be allowed to continue in the program would require the approval of the Executive Committee of the Faculty of Graduate Studies and Research.

The comprehensive and thesis examination processes must be conducted according to the principles and practices prescribed by the Faculty of Graduate Studies and Research.

See section under registration and course selection.

Grading System

Carleton University employs the 12-point system of letter grades to represent standing in graduate lecture courses, directed studies, seminars, tutorials, and some research essays and theses. The letter grades used, and the grade point equivalents, are as follows:

A+	12	B+	9
A	11	B	8
A-	10	B-	7
C+	6	D+	3
C	5	D	2
C-	4	D-	1

Under certain defined circumstances, notations are used instead of letter grades to represent standing. The only notations permissible in the Faculty of Graduate Studies and Research are the following:

- A notation of *Satisfactory* or *Unsatisfactory* may be assigned, subject to the approval of the Faculty of Graduate Studies and Research, in certain very special courses involving practicum,

field work, or other complex activities not easily adaptable to the 12-point system of grading.

- Comprehensive examinations are graded *Pass With Distinction*, *Satisfactory*, or *Unsatisfactory*.
- The Master's thesis is graded *Pass With Distinction*, *Satisfactory*, or *Unsatisfactory*, or it may be assigned a letter grade. The oral defence is graded *Satisfactory* or *Unsatisfactory*.
- The Ph. D. thesis and its oral defence are each graded *Satisfactory* or *Unsatisfactory*.
- A notation of *Incomplete* may, subject to the approval of the chairman of the department, be assigned to a course in which the student has been granted the privilege of submitting an assignment after the final deadline date. This notation of *Incomplete* will be permissible only in exceptional cases, (for example, medical or other special reasons) and must be replaced with a letter grade within 40 days of the end of classes. If the notation of *Incomplete* is not changed to a letter grade (through the regular change-of-grade procedures) within 40 days of the end of classes, the notation will remain as a permanent entry for that registration in the course. However, the student may register to repeat the course in order to obtain letter grade credit.
- A notation of *Absent* will be assigned to any course in which the student failed to attend the final examination. If the student explains his/her absence (in writing) to the dean of graduate studies and research within 14 days of that examination, he/she may be granted the privilege of undertaking a special or deferred examination. The notation of *Absent* will also be assigned where a student has terminated a course without formally withdrawing from the course prior to the end of classes; this notation is deemed to be the equivalent of a failure.
- If a thesis, research essay, or independent research project is not completed by the end of the period of registration, a notation of *In Progress* will be recorded. This notation must be replaced by an appropriate final notation or grade (as specified above) after the thesis, research essay or independent research project has been examined. In cases where a student has registered in a research essay or a thesis, without completing it, and later undertakes course work to complete the degree

program — or loses graduate student status in his/her program — the notation *In Progress* will be changed to *Incomplete*.

Academic Standing

Qualifying Year

The general regulations governing academic standing in the Qualifying Year conform to those of the Master's program.

Master's Program

A grade of B- or better must normally be obtained in each course counted towards the Master's degree. A candidate may, with the recommendation of his/her department, be allowed a grade of C+ or C (but not C-) in one full course or each of two half-courses. Some departments do not permit the C+/C option; students should check carefully to see if the department has a B- minimum rule.

Full-time Master's candidates who fail to achieve a weighted grade point average of 7.0 after two terms of study, or to maintain it subsequently, will be required to withdraw from the program. In the event of special or extenuating circumstances, the student may apply to the Executive Committee of the Faculty of Graduate Studies and Research for permission to continue in the program.

A part-time Master's student who fails to achieve or maintain a weighted grade point average of 7.0 after completing two full courses (or equivalent) will be required to withdraw from the program.

In addition to the above requirements, departments will undertake a periodic evaluation of a student's progress in his or her overall program of studies and research to determine whether that progress is satisfactory. In the event that it is deemed unsatisfactory, the student may be asked to withdraw.

Doctoral Program

Doctoral students must normally obtain a grade of B- or better in each course counted towards the degree.

In addition to the above requirements, departments will undertake a periodic evaluation of a

student's progress in his or her overall program of studies and research to determine whether that progress is satisfactory. In the event that is is deemed unsatisfactory, the student may be asked to withdraw.

Thesis Requirements

General Remarks

The thesis is a major requirement of most programs and, in conjunction with the research for it, makes up at least one-half of the time normally required for the program. The thesis must be expressed in a satisfactory literary form, consistent with the discipline concerned, and must display a scholarly approach to the subject and thorough knowledge of it. A critical review of previous work related to the subject should usually be given.

Master's Thesis

The Master's thesis should embody the results of successful scholarly research in a specialized area. It should exhibit the candidate's knowledge of recognized techniques of investigation and critical evaluation, and be presented in an organized and systematic way.

Candidates are ordinarily required to undertake an oral examination on the thesis. Notice of this examination will be given at least two weeks in advance by the chairman of the department.

The Master's thesis will be examined by a board consisting of at least three members, including the thesis supervisor, the chairman of the department concerned, and an examiner from a department other than that of the candidate.

The constitution of the examining board will be announced by the chairman of the department concerned; both it and the thesis examination process are defined by guidelines, principles and practices prescribed by the Faculty of Graduate Studies and Research.

Thesis weight (one to two full courses) must be identified at the time of admission. A change in the thesis weight at a later date would require the approval of the Executive Committee of the Faculty of Graduate Studies and Research.

Faculty regulations governing research essays and independent research projects are normally the same as those for a Master's thesis, and subject to the guidelines, principles and practices prescribed by the Faculty of Graduate Studies and Research.

Doctoral Thesis

The Ph.D. dissertation must report, in an organized and scholarly fashion, the results of original research. The thesis must be a contribution to knowledge, and must demonstrate the candidate's ability to undertake sustained research and to present his/her findings in an appropriate manner.

The dissertation must be defended successfully at an oral examination. Notice of this examination will be given at least two weeks in advance by the dean of the Faculty of Graduate Studies and Research.

The Ph.D. dissertation will be examined by a board consisting of at least five members, including the thesis supervisor, the chairman of the department concerned, an examiner from a department other than that of the candidate, the members of the candidate's advisory committee, the dean of the Faculty of Graduate Studies and Research or his delegate, and an external examiner who is a recognized authority on the subject of the thesis.

The constitution of the examining board will be announced by the dean of the Faculty of Graduate Studies and Research; both it and the thesis examination process are defined by guidelines, principles and practices prescribed by the Faculty of Graduate Studies and Research.

Thesis weight (ordinarily about half of the total Ph.D. requirement of 10 full courses) must be identified at the time of admission. If the thesis weight falls within a range of credit weights, it should be assigned at the time of admission a weight corresponding to the lower bounds of that range. A change in the thesis weight at a later date would require the approval of the Executive Committee of the Faculty of Graduate Studies and Research.

The work of each Ph.D. candidate will be assisted by an advisory committee of faculty members, who will aid him/her in his/her preparation

for the final comprehensive examination, and assist in the evaluation of the thesis and oral examinations.

Deadlines

A Master's student expecting to graduate at the spring convocation must submit his/her thesis or dissertation to his/her supervisor, in examinable form, by *April 2*. A Master's student expecting to graduate at the fall convocation must submit his/her thesis by *September 15*.

A Ph.D. student expecting to graduate at the spring convocation must submit his/her thesis or dissertation to his/her supervisor, in examinable form, by *April 2*. A Ph.D. student expecting to graduate at the fall convocation must submit his/her thesis by *September 15*.

Specifications

- The candidate must submit *four* typewritten copies (original and three carbons or acceptable duplicated copies, on bond paper) and must comply with special departmental requirements governing the form of the thesis, including methods of bibliographical entry and use of diagrams and tables.
- Each thesis or dissertation must be accompanied by a suitable abstract. The abstract of a Master's thesis should not exceed 150 words, while the abstract of a Ph.D. thesis may be up to 600 words in length.
- Regulations regarding style, pagination, certification, acceptance, grade and size of paper, as well as abstracts, reproduction, microfilming, binding, and the constitution of the examining board will be prescribed by individual departments.

The candidate is expected to notify his/her supervisor and the chairman of the department (at least two weeks in advance) of the date on which he/she intends to submit *four* copies of his/her completed thesis. The thesis examination and defence will be scheduled and the date announced at least two weeks in advance.

- The four unbound copies of the approved thesis submitted to the faculty for binding should be the original and three others, and must be presented in order of pagination in separate envelopes; the third copy is given to the department; the fourth copy is for the candidate.

Licence to the University and to the National Library of Canada

In the interest of facilitating research by members of the Carleton community and by interested outsiders, and in consideration of his/her having been accepted as a graduate student at Carleton, the student author of a thesis or dissertation submitted in partial fulfilment of the requirements for an advanced degree, shall grant to the University and to the National Library of Canada a licence to make single copies or microfilms (solely for the purpose of private study and research, in response to written requests from individuals, libraries, universities or similar institutions).

It is understood that the student author retains other publication rights, and that neither the thesis, nor the dissertation, nor extensive extracts from them, may be printed or otherwise reproduced without the author's written permission.

Withholding of Thesis Deposition

If, at the time of submitting his/her thesis, the student elects to protect any rights to immediate commercial publication, or to obtain a patent which may arise from his/her research, or to keep his/her thesis out of circulation for other reasons, he/she may apply in writing to the dean of graduate studies and research requesting that the thesis be withheld from deposit in the library:

- For an initial period of three months without reason
- For each additional period of six months, with reason (total period of restriction not to exceed two years).

The student must submit any request for extension of the restriction one month prior to the termination of the previous period. The student and his/her supervisor will be required to justify the extension of the restriction. Subsequent requests must follow the same procedure.

Time Limits

There are maximum time limits for the completion of programs. Candidates may also be subject to time constraints prescribed by individual departments to ensure orderly progress through the stages of their programs.

Master's Programs

Full-time

Full-time Master's candidates must complete their degree requirements within six terms of registered full-time study. Students admitted to a 10-course Master's program (that is, in the School of Public Administration and the School of Social Work) must complete their degree requirements within nine terms of registered full-time study.

Part-time

A part-time Master's candidate must complete his/her degree requirements within an elapsed period of six calendar years after the date of initial registration.

Combined Full-time and Part-time

A Master's candidate who elects to complete his/her program by a combination of full-time and part-time study is governed by the following elapsed-time limitation: five calendar years if the candidate is registered as a full-time student for two or three terms and part-time for the balance; four calendar years if the candidate is registered four or five terms as a full-time student and part-time for the balance.

Doctoral Programs

Full-time

A full-time Ph.D. candidate who is admitted on the basis of a Master's degree (that is, with a program of 10 full courses or the equivalent) must complete the Ph.D. degree requirements within an elapsed period of six calendar years after the date of initial Ph.D. registration.

Part-time

A Ph.D. candidate who undertakes the program by a combination of full-time and part-time study must complete the degree requirements within an elapsed period of eight calendar years beyond the Master's level.

Extension of Time Limit

In exceptional cases, an extension of time (one or two terms) may be granted to a candidate whose recent progress as judged by the department, has been otherwise satisfactory. Requests for extension of time should be directed to the dean of graduate studies and research through the department concerned.

Appeals

Academic Appeals

Within two weeks of the release of grades or the announcement of comprehensive examination results or thesis results, a graduate student may request, through the dean of the Faculty of Graduate Studies and Research, that one or more of his/her grades or results be reviewed.

A graduate student also has the right to appeal decisions made concerning his/her graduate status or any other ruling related to his/her program of studies.

All such appeals are to be made in writing, with an explanation of the pertinent circumstances, to the dean of the Faculty of Graduate Studies and Research. The appeal, and the reply of the department concerned, will be subsequently considered by the Executive Committee of the Faculty of Graduate Studies and Research.

Other Appeals

Appeals concerning matters of a non-academic nature should initially be directed to the Grievance Committee of the Graduate Students' Association.

If the problem is not resolved by this committee, in consultation with the administrative unit concerned, the matter will then be referred to the dean of the Faculty of Graduate Studies and Research for consideration by the joint Grievance Committee of the Faculty of Graduate Studies and Research and the Graduate Students' Association.

Graduation

On the recommendation of the Faculty of Graduate Studies and Research, and with the approval of the Senate of the University, degrees are conferred by the chancellor in the spring and fall of each year. In addition, candidates may have their degrees certified in February each year; they must apply by *December 15*.

Students expecting to graduate at the Spring Convocation must apply for graduation in the Graduate Studies and Research Office by *March 15*. Those expecting to graduate at the Fall Convocation must apply by *September 15*.

General Information

Hours of Operation

Bookstore

Labour Day to May

Monday to Thursday 9:00 a.m.—9:00 p.m.

Friday 9:00 a.m.—4:30 p.m.

There will be no refunds or exchanges without the Bookstore cash register receipt. Refer to the Bookstore refund/exchange policy, located in the Bookstore, for further details.

Business Office

Monday to Friday 9:00 a.m.—4:00 p.m.

Evening Service

Monday to Thursday 5:00 p.m.—7:00 p.m.

Library

Summer Session

Monday to Thursday 8:30 a.m.—11:00 p.m.

Friday 8:30 a.m.—6:00 p.m.

Saturday 10:00 a.m.—5:00 p.m.

(5:00 p.m.—10:00 p.m.)*

Sunday 1:00 p.m.—8:00 p.m.

(8:00 p.m.—10:00 p.m.)*

*Hours are extended after summer day division begins in July.

Winter Session

Monday to Thursday 8:30 a.m.—11:00 p.m.

Friday 8:30 a.m.—6:00 p.m.*

Saturday 10:00 a.m.—10:00 p.m.*

Sunday 12:00 noon—10:00 p.m.*

*Week-end hours are extended to 11:00 p.m. during periods of heavy use.

When classes are not in session hours vary and are posted at the entrance.

The Alumni Association of Carleton University

The Alumni Association is an informal body which encompasses all graduates from the University. Its primary function is to contribute to the development of the University, academically and otherwise,

with the objective of enhancing the effectiveness with which the University fulfils its role in society. In addition, the Alumni Association exists to ensure mutually beneficial relations and communication between the University and its alumni and among the alumni themselves.

Alumni records are maintained by the Development Office, which is also responsible for all alumni fund-raising activities. Alumni communication programs are carried out through the Information Office.

All alumni activities and programs are supervised by the Alumni Council, composed of a representative elected body of alumni volunteers.

Athletics and Recreation

The athletics and physical recreation program at Carleton, which plays an important role in maintaining and enhancing the University spirit, is determined by the policies established by the Athletic Board, a committee consisting of students, faculty members and administrators.

At the intercollegiate level, Carleton is a member of both the Ontario University Athletic Association (for men) and the Ontario Women's Intercollegiate Athletic Association. Varsity programs for men include basketball, football, cross-country skiing, waterpolo and fencing. The women's teams participate in basketball, volleyball, cross-country skiing, synchronized swimming, and fencing. Graduate students are eligible for intercollegiate athletics, subject to league regulations.

The intramural program includes touch football, cross-country running, basketball, broomball, badminton, swimming, curling, and hockey. Some of these sports are co-educational, although most are played separately by men and women.

Carleton's athletic facilities currently include football and soccer fields, an outdoor hockey and skating rink, five all-weather tennis courts, a 50-metre swimming pool, fitness centre, and a gymnasium complex, which includes such facilities as squash courts, combatives room, gymnastics and multipurpose room, and a gymnasium. These facilities are available for use by Carleton students for organized and recreational sports activities.

Computing Services

Carleton University offers a modern and wide range of computing services to its students, since it is now recognized that practically every field of scientific and business-oriented endeavour can benefit from some type of computer assistance. Many departments have their own mini-computer systems that are applied to current research work, and students are often able to make use of these. The large main-site system, however, is the one generally used to supply service to students who require it for academic work. At present, the main-site system is a Xerox Sigma 9, augmented by a Honeywell Level 66.

- **User-Seen Hardware**

There are several methods that can be used at Carleton to obtain computed results; these are differentiated by the various kinds of hardware employed. Timesharing, a computing technique in which many terminals can share a central computer concurrently, offers the easiest mode of use. Terminal clusters exist in many buildings on campus, including the Arts Tower, Loeb, Mackenzie, the library, Steacie, and Herzberg. Whether from time-sharing, or from a batch job, a user program can direct output to either of the plotting devices in order to produce graphs and diagrams. These plots can be mailed to their owner's pick-up site when completed. It is also worth noting that Carleton is linked to the University of Ottawa computer, so that a job can be submitted from this campus and its listing printed here, but it will actually be run on the IBM computer at the University of Ottawa. This essentially makes all the catalogued programs at both universities available to every Carleton student.

- **Academic Support Group**

The Academic Support Group of Computing Services is staffed by 15 computing professionals who are charged with the task of keeping Carleton's collection of programs up to date. They maintain COBOL, FORTRAN, APL and PASCAL language processors, among many others, for the use of computing science and programming courses. Modern data analysis packages, such as SPSS and BMDP, and the IMSL mathematical library, are

available for students using statistical methods of research, and several easily-used plotting programs have been developed by the Academic Support Group to facilitate the use of graphics. The co-ordinator of User Services can provide any interested user with a complete catalogue of available programs.

Any large computing system can be difficult to use, if only because the sheer number of possible options can make the choice of any single way of proceeding seem impossible. Recognizing this, the Academic Support Group offers a reliable consulting service that extends all the way from part-time employees hired to try to sort out problems shown to them by students, to senior employees with actual research experience who can advise on the best ways to set up and run the computing applications in a research project. All of this user assistance is supplemented by documentation in the form of mini-texts (short leaflets written by Computing Services), on-line news, full scale, vendor-supplied manuals, and on-line HELP files.

Counselling Services

The University Counselling Services is an educational resource centre available to all members of the University community. It provides a variety of learning experiences to facilitate personal growth and adjustment, maximum development of individual potential, and the realization of personal, academic and career goals. To this end, a qualified team of counselling professionals offers a wide range of services and programs.

All contacts with Counselling Services are voluntary and strictly confidential. Information is only released upon the request and consent of the client involved.

Other types of assistance include appropriate on- and off-campus referrals when required, and consultation regarding the problems of another person.

The centre is located in Room 1201 of the Arts Tower, with office hours from 9:00 a.m. to noon and from 1:00 p.m. to 5:00 p.m. Further information about services and programs may be obtained from the centre in person, or by telephone at 231-4408.

- **Counselling Services**

Personal counselling affords the opportunity of learning to deal more effectively with emotional and social concerns. Educational and career counselling involves learning to plan wisely, handle difficulties, and make decisions with regard to academic and vocational concerns. Individual and group approaches are used in providing counselling and therapy.

- **Testing Service**

A testing program is designed in consultation with a counsellor, and constitutes an individual assessment according to the type of self-knowledge required. Relevant information generated by interest, personality, ability, and achievement test results is used in helping to determine goals and make choices.

- **Information Services**

A resource centre is maintained for use in educational and vocational planning. It includes materials on occupations, university and community college calendars, directories and other types of career literature. Information regarding other sources of assistance at Carleton and in the greater Ottawa community is also available.

- **Learning Assistance Service**

Various programs and activities are designed to create learning experiences which further the development of effective reading and study skills. Testing, instruction and practice are provided to correct difficulties and improve the ability to learn and study. Individual and group approaches are utilized.

- **Foreign Student Advisory Service**

Counselling concerning any difficulties which a foreign student may experience while at Carleton is available through this service. Student assistance is provided for academic and non-academic difficulties, financial concerns, health and immigration regulations, and adaptation problems; phone 231-3724.

- **Group Programs**

These afford opportunities to be involved in a variety of experiences in which learning is best facilitated through group participation. They are offered periodically throughout the year. The nature and content of programs are publicized, along with dates and registration details.

Day Care Centre

The Day Care Centre at Carleton operates in two locations on campus, Renfrew House residence and the Loeb Building. The centre is open all year except for statutory holidays and the hours are from 8:00 a.m. to 5:45 p.m., five days a week.

Currently, the ages of children are 6 months to three years, and children must leave during the month in which they reach three years. Priority is given first to children of students, then to the children of faculty and staff at Carleton. Should there be vacancies, children will be taken whose parents are not affiliated with Carleton.

There is usually a waiting list, so it is advisable to apply some months before a place is actually required.

Inquiries should be addressed to Sandra Thompson at 231-5521 (for children six months to 24 months) and Margot Henderson at 231-6312 (for children 24 months to 36 months).

Fees

Fees at Carleton are calculated on a composite basis to include tuition, the Students' Association and the Graduate Students' Association, Athletics, University Centre, and Health Services fees. The fees for the 1980-81 year are listed below because an approved schedule for the 1981-82 year was not available at the time that the calendar went to press. It is anticipated that the fee structure will remain basically the same.

Canadian Citizens and Landed Immigrants

• Full-time

Master's Program

*(first year of full-time study)

Tuition	\$407.00
Students' Association	10.85
Athletics	16.65
Health	5.85
University Centre	6.65
Total composite fee (per term)	\$447.00

(second or subsequent year of full-time study)

Tuition	\$195.00
Students' Association	10.85
Athletics	16.65
Health	5.85
University Centre	6.65
Total composite fee (per term)	\$235.00

Doctoral Program

(first and second year of full-time study)

Tuition	\$407.00
Students' Association	10.85
Athletics	16.65
Health	5.85
University Centre	6.65
Total composite fee (per term)	\$447.00

(third or subsequent year of full-time study)

Tuition	\$195.00
Students' Association	10.85
Athletics	16.65
Health	5.85
University Centre	6.65
Total composite fee (per term)	\$235.00

Qualifying Year and Diploma in Public Administration

Arts, Journalism, D.P.A.

Total composite fee (per term)	\$466.50
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*First and second year of full-time study for students in Public Administration and Social Work.

Science

Total composite fee (per term)	\$471.50
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Engineering

Total composite fee (per term)	\$500.00
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• Part-time

Tuition	\$158.00
Students' Association	6.50
Athletics	10.00
Health	3.00
University Centre	4.00
Total composite fee (per course)	\$181.50

Students who require additional time on a *part-time* basis to complete theses, research essays, or the I.E.P. must register for each subsequent term, at a per-term fee equivalent to the prevailing fee assessment for a half-course.

Foreign Students

• Full-time

Master's Program

*(first year of full-time study)

Total composite fee (per term)	\$ 846.00
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(second or subsequent year of full-time study)

Total composite fee (per term)	\$ 688.00
--------------------------------	-----------

Doctoral Program

(first and second year of full-time study)

Total composite fee (per term)	\$ 846.00
--------------------------------	-----------

(third or subsequent year of full-time study)

Total composite fee (per term)	\$ 688.00
--------------------------------	-----------

Qualifying Year and Diploma in Public Administration

Total composite fee (per term)	\$ 866.00
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• Part-time

Total composite fee (per course)	\$ 345.50
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*First and second year of full-time study for students in Public Administration and Social Work.

Method of Fee Payments

Fees may be paid in accordance with either of the following: payment in full at the time of registration, or payment in two installments:

- at registration, half of the total tuition fee, plus all miscellaneous fees (where applicable), plus a deferred payment fee of \$.50 per half-course (four or more courses: \$5.00)
- on or before January 15, the remaining half of the total tuition fee.

Scholarships, bursaries, and loans administered by the University will be applied first to fees, provided that this is not contrary to the terms of the award.

Personal cheques will be accepted for the payment of accounts, but the University reserves the right to cancel this policy if it is abused. A service charge of \$5 will be assessed for each cheque returned to the University as non-negotiable for any reason. Students are requested to provide their own cheques when making payments.

A statement of tuition fees paid may be obtained for taxation purposes by applying to the Business Office in February.

Late Registration Fees

Full-time Students

\$10 first week after the regular registration period;
\$15 second and third weeks after the regular registration period.

Part-time Students

\$5 per course after the regular registration period.

Examination Fees

Special final examinations written at Carleton University

\$10 per paper.

Examinations written at a university centre other than Carleton University (when permitted)

\$20 per paper.

Transcript Fees

All students are entitled to two free copies of their official transcript. Additional copies will be issued at a charge of \$1 for the first, \$.50 for the second, and \$.25 for each further copy (at any one time of ordering).

Reinstatement Fee

Students who have lost graduate student status and who later become reinstated in their programs are required to pay a reinstatement fee of \$25.

Deposit — Gowns and Hoods

At each convocation, the University makes available to graduating students the appropriate academic regalia. A \$25 deposit is required, which will be refunded when the regalia are returned.

Delinquent Accounts

Registration will not be complete until a satisfactory arrangement has been made for the payment of fees, and it may be cancelled should the student fail to meet these arrangements.

If a student owes the University *any* money at the end of an academic session, his account becomes delinquent.

Students with delinquent accounts will not receive examination results, are not permitted to receive transcripts, may not graduate, and will not be permitted to register again until all monies have been paid in full by cash or certified cheque.

Health Services

The function of Health Services is to protect and improve the physical and mental health of the students and of the University community. Its responsibilities are to provide consultation, treatment, and advice on matters of health, and to ascertain the fitness of students to perform academic work. When the necessary service cannot be provided by the program, appropriate referrals will be made. Confidentiality is respected at all times.

Health Services has regular hours and is staffed by physicians, nurses, and psychiatrists. The main clinic is on level six of the University Centre, open from 9:00 a.m. to 5:00 p.m. For an appointment, call 231-2755.

Medical excuses will not be issued by Health Services for examinations and term papers which are missed because of illness. If confirmation of the illness is required, the instructor may contact the treating physician.

After Hours Service

Students who become ill when the main clinic is closed may contact the after hours service. A nurse is in attendance from 9:00 a.m. to 5:00 p.m. Monday through Friday, and 24 hours a day on weekends. Doctors are on call for those persons requiring immediate attention during these hours. Beds are available for persons who require observation for a few hours or overnight.

The service is open from September to May, and is located at 226 Glengarry House; telephone 231-3844.

Health Regulations

Medical insurance is compulsory for all full-time students. It is the student's responsibility to provide the insurance number when receiving medical care.

All Ontario students should be covered by OHIP. Continued coverage is not automatic after the student's twenty-first birthday and must be applied for in his/her own name. Full-time students may be eligible for premium assistance to help pay the OHIP premium.

Students whose home residence is outside Ontario should have coverage under their provincial plan. These claims for medical services are processed directly at Health Services.

Students entering Ontario from outside Canada and applying immediately for OHIP coverage will have effective coverage the first day of the month following application.

Tuberculosis Control

On admission to the University, every student requires a tuberculin skin test, or chest X-ray if tuberculin positive. Tuberculin skin tests are administered in Health Services, level six of the University Centre, or at provincial chest clinics.

Housing and Food Services

Residences

There are currently five residence houses on the Carleton campus which accommodate a total of

1,336 students in male, female, and co-educational living arrangements.

Residence accommodation is for full-time Carleton students, graduate and undergraduate; within the residence, graduate and senior undergraduate students are accommodated in single rooms, with first and second levels of Glengarry House now being reserved exclusively for graduate students. Currently, there are no facilities on campus for married students.

Residence applications are sent to students *only* when they are offered admission to full-time study at Carleton.

Off-Campus Housing

An off-campus housing information service is available to students who are unable to obtain or do not wish to have on-campus residence accommodation. The service has been established to assist out-of-town students, but is in no way a rental agency.

Listings of available accommodations are posted in the second-level corridor of the Commons Building. This area is open seven days a week, night and day, for your convenience.

It is not possible to mail out listings of accommodation as such lists become outdated too rapidly.

Food Services

All students residing in residence must take a meal program: 14 meals a week (lunch and dinner). The breakfast plan is optional, and is not included in the residence fees.

Students living off campus may use the residence dining facilities by purchasing a campus dining plan, or eating individual meals in the dining halls. Additional dining, cafeteria and vending facilities are located throughout the campus.

For further information, students should contact the Student Housing Office, Room 223, Commons Building.

Library Regulations

All persons registered at the University are entitled to use the library. Graduate students may borrow most books for a period of up to four weeks,

although some books are placed on "Reserve" and may be borrowed for five days only, or on an over-night basis. Alumni of Carleton University, on payment of the appropriate fee, and graduates and students of other universities, on payment of the appropriate fee, and at the discretion of the University librarian, may have limited borrowing privileges. The University participates in Ontario and Quebec inter-university borrowing arrangements, which allow students in good standing to borrow directly from other Ontario and Quebec universities.

If books are not returned to the library when due, fines and billing costs will be charged.

The book collection is protected from theft by an electronic detection system, and as a condition of use of the library facilities, all users must, if requested to do so, submit books, briefcases, bags, etc., for inspection at the exit.

Placement and Career Counselling — Canada Employment Centre

The Placement and Career Counselling Service is provided by Employment and Immigration Canada through the establishment of an on-campus Canada Employment Centre (CEC). The CEC is located in Room 508 of the University Centre, and can be reached by phone at either 231-2600 or 996-9590. The purpose of the CEC service is twofold:

- *To provide students with readily available access to employment opportunities*

To this end, the centre maintains job boards listing part-time, summer, and permanent employment opportunities. Also, each year the centre arranges for a large number of representatives from government, as well as from business and industry, both local and national, to recruit at Carleton. While the majority of these visits are for permanent employment, a number of them are arranged for undergraduates seeking summer employment. Students interested in participating in this program are advised to contact the centre upon returning to classes in the fall, as recruiting visits commence early in October.

- *To provide students with information about and assistance in preparing for entry into the labour market*

Individual and group counselling, covering such topics as career areas, labour market trends, the job hunt, and résumé preparation, is available to students seeking or preparing for employment. Students can supplement the counselling provided by reviewing materials maintained in the centre's library, as well as by contacting Counselling Services, at the University.

All placement and career counselling information may be obtained by visiting the centre, or by referring to the "CEC Weekly Bulletin" posted throughout the University. The University newspapers and radio station are additional sources for information from the centre.

Student Government

Carleton University Students' Association

All registered students, full- and part-time, are members of the Students' Association. The Students' Association has two main functions — providing services to students, and representing their views on a wide range of interests both internally and externally.

The legislative body for the Students' Association is Students' Council. Elected representatives from each faculty serve for 12 months with the one graduate representative elected by the Graduate Students' Association in October. The president of the Students' Council, Finance Commissioner, and undergraduate representatives are elected in the spring, and the rest of the executive is appointed by the president, subject to council's approval, shortly thereafter.

The Students' Association provides a variety of services, including a pub, coffee house, box office, and Information Carleton. The Charlatan is the campus newspaper, published by the Joint Board, a CUSA-Charlatan management committee.

CUSA holds the licenses on an FM radio station, CKCU — Radio Carleton. The station broad-

casts on 93.1 and is heard all over the national capital region and in points of eastern Ontario.

Each year, new services are offered, dependent on the orientation of the current Students' Council.

A major part of the Students' Association is the University Centre, run by the association for the whole University community; policy is set by the Students' Council. The University Centre houses the following facilities: food services, lounges, main hall, meeting-dining rooms, variety store, table tennis and billiards tables, Students' Council offices, Faculty Club, arts and crafts workshop, reading rooms, Health Services, Canada Employment Centre, etc. It is open from 7:30 a.m. to 2:00 a.m. most days.

Students' interests are represented by the association's membership in the Ontario Federation of Students and the National Union of Students. On campus, the Students' Council each year tackles a number of issues which have ranged from university government to reviewing athletics to the financing of post-secondary education. CUSA has two researchers in its employ who staff the Education Office. These individuals are able to provide students with complete information regarding academic concerns and provincial and federal policy changes.

The Students' Association offices are located in Room 401 of the University Centre and may be reached by phone at 231-4380.

Student Participation in Academic Affairs

New University Government (N.U.G.) is a governing system wherein all faculty members and some students are formally involved in the government of the University at the departmental, faculty board, and Senate levels.

The first level is election to the faculty and departmental boards through a general election among all the graduate students in the various departments. From here, it is possible to get support from a majority of faculty and get elected to Senate.

Awards and Financial Assistance

General Information

Awards Policy

In recent years Carleton graduate students have won a large number of external scholarships, such as SSHRCC fellowships and NSERC and Ontario government scholarships. In addition, the University itself provides generous support and the majority of graduate students receive funds from this source. Scholarships and assistantships have ranged from relatively small sums up to \$9,000 per annum. Students are expected to participate in the activities of departments by accepting responsibilities either as teaching or research assistants, or demonstrators. These activities are part of the learning experience, but at the same time provide training which is useful in seeking employment after completion of the degree.

Holders of awards must pay regular tuition fees unless otherwise stated.

Full-time graduate students at Carleton are expected to comply with the following procedures:

- Any full-time graduate student who accepts an award that is not directly administered by Carleton University must immediately inform his departmental chairman and the dean of graduate studies and research in writing. This requirement applies to any awards or assistance offered by any agency or institution.
- Any full-time graduate student who accepts part-time employment outside the University is required to inform his departmental chairman and the dean of graduate studies and research, in writing, prior to undertaking the work.

Application Deadlines

March 15 is the last date for receipt of completed applications for admission (including transcripts, letters of reference, etc.) from candidates who wish to be considered for the initial award, announced April 1, of financial assistance administered by Carleton University.

Candidates whose applications are received after the March 15 deadline may be eligible for the award of a scholarship and assistantship by reversion. These are normally considered on or about May 15, August 15, and October 1.

Method of Payment

All awards administered by Carleton University will be paid on a monthly basis, with the first instalment on *October 1*.

Students are urged to note the above payment dates and be prepared to be financially self-sufficient during the month of September.

Other Awards

A number of national and provincial organizations award fellowships and scholarships that are tenable at Carleton University (for example, SSHRCC, NSERC, etc.) Some application procedures and regulations concerning fellowships awarded by agencies other than Carleton University are given in the description of each of these awards.

In addition, a large number of foundations, companies, fraternal organizations, and other agencies offer fellowships and scholarships. A booklet providing details of deadlines and application procedures has been compiled and may be consulted in the Graduate Studies and Research Office.

Eligibility

In the case of fellowships, grants, scholarships, etc., for which students must make application, it is the individual student's responsibility to establish his eligibility. Should it become known that a student is unqualified for any reason, he must return the funds already received, with the University assuming no responsibility.

Departments recommending students for internal awards must accept full responsibility for the eligibility of their nominees.

Students are urged to consult carefully the brochures and announcements which specify the conditions associated with tenure of individual awards. This information is available in the Graduate Studies and Research Office and in departmental offices. An up-to-date listing of awards is published in the Carleton University newspaper, *This Week at Carleton*.

Awards Administered by Carleton University

The awards administered by Carleton University are derived from a variety of sources. Throughout the years, a number of individuals and organizations have contributed substantial funds to the University, through bequests and donations, in order to help support students in various fields of study.

It is not always possible to identify precisely the sources of various donations and bequests (often small, but most important in the aggregate) from which any graduate student's financial support has been constructed. These sums, together with the assistantship funds made available from the University budget, make up the reservoir from which the Carleton scholarships and assistantships are drawn.

In some cases, however, either because of the relative importance of the contribution or because of the fact that it is earmarked for a specific type of student or program, we do identify the external source from which the award has originated.

The David and Rachel Epstein Foundation Scholarships

Part of the income from the David and Rachel Epstein Foundation Fund has been designated to provide scholarships, established in 1970, for outstanding graduate students at Carleton University. They may be held in combination with a teaching or research assistantship.

Application is not required; recipients are chosen from the list of candidates recommended by each department.

John Ruptash Memorial Fellowship

This fellowship was established in 1974 by relatives, former students, faculty colleagues and friends as a memorial to the late John Ruptash, who was dean of engineering and later dean of graduate studies between 1959 and 1973. The fellowship has been awarded annually, beginning in 1975-76, to an outstanding graduate student in the Faculty of Engineering; it may be held in combination with a teaching or research assistantship. Application is

not required; the recipient will be chosen by the awards committee from candidates recommended by the Faculty of Engineering.

Zbigniew A. Jordan Scholarship

This award, established in 1978 by friends and colleagues in honour of the late Professor Zbigniew A. Jordan, is open to all graduate students in sociology.

Application is not required; the recipient will be chosen by the awards committee from candidates recommended by the Department of Sociology and Anthropology on the basis of merit and special interest in sociological theory and the philosophy of social sciences.

Philip E. Uren Fellowship

This fellowship is awarded annually to a graduate student in either the Department of Geography or the Norman Paterson School of International Affairs; it may be held in combination with a teaching or research assistantship. Application is not required; the recipient will be chosen by the awards committee from the units involved. The fellowship was established in 1980 by relatives, friends, former students, and faculty and staff colleagues as a memorial to the late Philip Ernest Uren who was a Professor of Geography between 1965 and 1979, and who served the University as chairman of the Department of Geography, director of the Institute of Soviet and East European Studies, director of the Norman Paterson School of International Affairs, and director of the Paterson Centre for International Programs.

Paterson Fellowships

From the generous support provided by the Honourable Norman M. Paterson when the school was established in 1966, funds are allocated to support some candidates for the M.A. degree in the Norman Paterson School of International Affairs.

All those with high standing who are admitted to this program are considered for these fellowships.

The John Porter Publication Grant

This grant, established in 1979 by friends and colleagues of the late John Porter, will be awarded annually and is open to authors of book-length works. The applicants must be members of the Carleton University community whose manuscripts have been accepted by a reputable publisher, or persons not affiliated with Carleton University, whose manuscripts have been accepted for publication in the Carleton Library series.

The award, which carries a value of \$1,000 (to be applied against the costs of publication of the work), will be made on the basis of overall merit and contribution to the literature dealing with aspects of Canadian society. The recipient will be expected to deliver a public university lecture on the topic of the book, at or near the time of publication.

Applications or nominations should be directed to the Grants Committee, appointed by the Vice-President (Academic). The committee may decline to make an award in a given year for lack of meritorious candidates.

The Norman Pollock Memorial Award for Canadian Jewish Studies

This award, endowed by David A. Pollock and Susan A. Harkavy, will be granted annually to an outstanding graduate student in the Institute of Canadian Studies for research in Canadian Jewish studies. Part of the award may be allocated towards underwriting the cost of publication of this research.

No application is required; the recipient will be selected on the recommendation of the director of the Institute of Canadian Studies. In a given year, the award may not be made for lack of eligible candidates.

I.O.D.E. Eva Leadley Clark Award

Through the sponsorship of the Amelia F. Sims Chapter, I.O.D.E., a scholarship derived from a legacy by the late Eva Leadley Clark is offered annually to a student entering the Master of Journalism program.

The scholarship, valued at \$1,000, will be awarded on the basis of academic standing and need.

R.F. Chinnick Memorial Scholarship

This scholarship is provided by Telesat Canada in memory of R.F. Chinnick, their former vice-president of engineering and operations. It is awarded annually, where appropriate, to a student enrolled in a graduate program in electrical engineering who is working in the field of satellite communications, or whose work has direct relevance to this area of telecommunications.

It is normally awarded in the second or subsequent year of graduate work when the student's area of specialization has been well established. It may be awarded more than once to the same student, and if an award is not appropriate in a given year will be held over so as to allow more than one recipient in a subsequent year.

Xerox Canada Inc. Graduate Scholarship in Public Administration

This award of \$3,000 is presented annually to an outstanding student entering the first year of the M.A. program in the School of Public Administration. Established in 1980, the scholarship is provided by Xerox Canada Inc.

Fred Barkley Special Bursary

This bursary, in the amount of \$500, is awarded annually to a graduate student from a developing country who requires special financial assistance in order to study at Carleton University. The recipient of the award will be announced by the dean of graduate studies and research in September each year.

Roy Buckley Morrison Scholarship

This scholarship was established in 1979 in honour of the late Roy Buckley Morrison by Panasonic/Matsushita Electric of Canada Limited, and friends and associates. It will normally be awarded to a Canadian citizen or permanent resident of Canada, registered in the Norman Paterson School of International Affairs.

Application is not required; the recipient will be chosen by the awards committee from candidates recommended by the school on the basis of merit and special interest in conflict analysis, and/or studies in strategy and security.

William Roxburgh Memorial Award

This award was established in 1981 by Gwenda and Ross Roxburgh, and is open to all graduate students in the Institute of Canadian Studies. The amount of \$100 is provided annually to assist students in carrying out research projects.

Application should be made to the director of the Institute of Canadian Studies; recipients will be chosen from a list of candidates recommended by the director.

R.O. MacFarlane Memorial Book Award

This award is presented annually to an outstanding student registered in a graduate program in the School of Public Administration at Carleton University. Endowed in 1971 by relatives, friends and graduates of Carleton University, the award is named in honour of the late R. Oliver MacFarlane, first director of the School of Public Administration, 1953-71.

Special Bursary for Students in Social Work

This bursary, in the amount of \$1,000 annually, may be awarded to one, or divided between two students in the School of Social Work who require special financial assistance in order to complete their studies at Carleton University. The selection of the recipient(s) will be decided on the recommendation of the director of the School of Social Work.

Graduate Bursaries

A full-time graduate student who experiences *unexpected* financial need, after completion of five weeks from the date of most recent registration, may be awarded a bursary of up to \$200 for that term (with a maximum of \$500 for three consecutive terms). Application forms are available from departments and from the Graduate Studies and Research Office.

Residence Fellowships

Residence fellowships for men and women, providing free accommodation and meals for one academic year, are available to students of Carleton

University. Applications are invited from graduate and senior undergraduate students with good academic standing.

Application forms may be obtained from the Student Housing and Food Services Office, Carleton University, Ottawa, Ontario K1S 5B6. Deadline is January 30.

Awards Tenable at Carleton University

Social Sciences and Humanities Research Council of Canada

The council offers fellowships ranging in value up to \$7,860 for studies and research at the doctoral level in the humanities and social sciences.

These fellowships are tenable in Canada or abroad for a maximum of 12 months and may be renewed upon application.

Application forms and brochures containing details of the assistance programs available may be obtained from the Graduate Studies and Research Office, or from the chairman of the department concerned, or by writing to the council, P.O. Box 1610, Ottawa, Ontario, K1P 6G4. Applications must be submitted by November 15.

Special M.A. Scholarships and The Queen's Fellowships

To be eligible for these awards, (offered by the SSHRCC) a student must be nominated by a faculty member of a Canadian university and be in his/her final year of an Honours B.A. program (or its equivalent) at a Canadian university, or hold an Honours B.A. degree (or its equivalent) from a Canadian university and not yet have begun a Master's program. Nominees must be Canadian citizens, have first-class standing in their present program or previous programs, and intend to pursue full-time graduate studies at a Canadian university.

The value of the award is \$7,860, plus travel allowance for the award holder only, and it is tenable for 12 months; the Queen's Fellowships also include tuition fees. Nominations must be submitted on a nomination letter provided by the

regional chairman; the closing date for nominations from faculty members is November 15.

Canada Mortgage and Housing Corporation Scholarships

The Canada Mortgage and Housing Corporation offers graduate scholarships for full-time study in various fields related to housing in its urban and regional context.

This competition is open only to Canadian citizens or landed immigrants who wish to study the social, physical, environmental, economic, legislative or administrative aspects of housing. The value of a CMHC University Scholarship is \$5,400 per annum personal allowance, plus cost of travel from residence to place of study, university tuition fees and \$960 for each dependent child. The scholarship is tenable at a Canadian university only.

Application forms, which are available in the Graduate Studies and Research Office, must be submitted by February 28 for transmission to CMHC by March 15.

Commonwealth Scholarships and Fellowships

The Government of Canada, through the Commonwealth Scholarships and Fellowships Committee, offers annually a number of scholarships and fellowships, normally tenable for two years, which cover such expenses as travelling costs, tuition fees, other university fees, and a living allowance, to students of other Commonwealth countries.

Under a plan drawn up at a conference held in Oxford in 1959, these scholarships and fellowships are awarded mainly for graduate study, and are tenable in the country making the offer.

Students are advised to consult the Graduate Studies and Research Office for details of the terms of the awards, or to write to the Association of Universities and Colleges of Canada, 151 Slater Street, Ottawa, Ontario K1P 5N1.

Persons intending to apply for the year 1982-83 are advised to inquire not later than mid-October, approximately one year prior to the date of tenure.

Natural Sciences and Engineering Research Council

NSERC Postgraduate Scholarships (\$8,500 for 12 months, plus travel) are tenable at Carleton University by students undertaking advanced studies and research in science, engineering, experimental psychology, and physical geography.

Students currently enrolled at Carleton University must apply through their departments on or before November 5 on prescribed forms available from the Graduate Studies and Research Office.

1967 Science Scholarships

NSERC annually offers 1967 Science Scholarships, valued at \$11,200 for 12 months, plus a travel grant.

The university selection committee will determine which, if any, of the candidates for post-graduate scholarships (for a first year of graduate studies) are sufficiently outstanding to be nominated for a 1967 Science Scholarship. Applications (including supporting documents) must be sent to the Graduate Studies and Research Office by November 5.

These awards are tenable in any Canadian university other than the one from which the candidate expects to receive his Bachelor's degree.

Ontario Graduate Scholarships

The Province of Ontario annually offers scholarships of \$1,630 per term to applicants with a high level of academic achievement (first-class standing in most courses) who intend to pursue graduate studies at an Ontario university. These awards are not available to students in a qualifying or "make-up" year.

Completed application forms must be submitted through the Graduate Studies and Research Office no later than December 1.

The Queen Elizabeth II Ontario Scholarships

The Queen Elizabeth II Ontario Scholarship Fund provides a number of annual awards, valued at \$9,000, plus a general expense allowance of \$500, for candidates expecting to be in the final year of their Ph.D. research and writing during their tenure of the award.

The scholarships, open only to Canadian citizens and landed immigrants, are tenable only at Ontario universities. Preference will be given to candidates who are residents of Ontario.

Prescribed application forms are to be completed and submitted to the dean of the Faculty of Graduate Studies and Research by December 1 for transmission to the selection committee by December 15.

Sir John A. Macdonald Graduate Fellowship in Canadian History

The Province of Ontario annually offers the Sir John A. Macdonald Graduate Fellowship, valued at \$6,500, for full-time graduate studies and research in the field of Canadian history at the Ph.D. level. The fellowship is tenable for three years, at an Ontario university only, and it will be awarded to a Canadian citizen resident in Ontario.

Application forms and additional information can be obtained from the Graduate Studies and Research Office. The deadline date for submission of completed applications to the dean of graduate studies and research is February 15.

Department of National Defence Scholarships and Fellowships

The Department of National Defence offers scholarships and fellowships for strategic studies of relevance to current and future Canadian national security problems, including their political, economic, social and military dimensions. Applicants must be Canadian citizens and must, before closing date of the competition, hold a Ph.D. degree or equivalent (for the fellowship) and for the scholarship, a candidate must hold an Honours bachelor's degree or equivalent.

Awards are valued at \$15,000 and \$7,500 respectively. Deadline is February 1.

Transport Canada Fellowships and Assistantships in Transportation

Transport Canada awards a number of fellowships valued at \$7,200 - \$8,700 plus tuition fees for 12 months (Master's and Ph.D. levels) for full-time graduate study in any discipline related to transportation.

Applicants must be Canadian citizens or landed immigrants. The awards are tenable at any Canadian university, but in special circumstances doctoral awards may be approved for tenure outside of Canada.

Application forms may be obtained from the Graduate Studies and Research Office or from Transport Canada (Ottawa). Completed applications must be postmarked no later than January 19.

Bell Canada Fellowships

Bell Canada awards eight \$5,000 fellowships annually, covering a 12-month period, for students who are proceeding towards a Master's degree. Applicants must be Canadian citizens or have held landed immigrant status for 12 months prior to submitting applications; they must also have been residents of Ontario, Quebec, or the parts of the Northwest Territories served by Bell Canada, for 12 consecutive months immediately prior to submitting their applications.

Further information and application forms are available from the Association of Universities and Colleges of Canada, 151 Slater Street, Ottawa, Ontario K1P 5N1. Deadline is February 1.

Gulf Oil Canada Limited Graduate Fellowships

Nine graduate fellowships will be awarded annually to candidates in business and management studies, computer sciences, mathematics, geology, geophysics, engineering, physics, chemistry, ecologically-oriented studies, and other sciences related to the petroleum industry.

The fellowships, tenable at any Canadian university or college which is a member, or affiliated member of AUCC, are open to Canadian citizens or landed immigrants. Each fellowship is valued at \$7,500. (\$6,500 will be paid to the successful candidate and \$1,000 will be paid to the relevant department of the receiving university in which the fellow is registered.)

Further information and application forms are available through the Association of Universities and Colleges of Canada, 151 Slater Street, Ottawa, Ontario K1P 5N1. Deadline is February 1.

Imperial Oil Graduate Research Fellowships

Six fellowships are offered by Imperial Oil; three in the pure or applied natural and exact sciences, and three in the social sciences and humanities. These are valued at \$5,000 each per annum for a period of up to three academic years, and are open to any Canadian graduate of an approved university for research leading to the doctoral degree.

Application forms are available from the Graduate Studies and Research Office. Deadline is February 1.

I.O.D.E. War Memorial Scholarships

Ten scholarships are offered annually by the Imperial Order Daughters of the Empire for post-graduate study and research in the humanities or social sciences. The awards are valued at \$6,500 for study in Britain or another country in the Commonwealth, and \$5,500 for study in a Canadian university.

Candidates must be Canadian citizens and graduates of recognized colleges or universities.

Additional information and application forms may be obtained by writing to Mrs. P.C. Cockburn, I.O.D.E. War Memorial Convener, 606-807B Frederick St., Kitchener, Ontario N2B 2B4. Deadline is December 10.

J.H. Stewart Reid Memorial Fellowship

This fellowship provides an award of \$4,500 for 12 months for any field of study in a graduate program in any Canadian university. It is open to students who are Canadian citizens, or who have held landed immigrant status from February 1, 1978 and have been admitted to a Canadian graduate program by the time of award. Applications, due February 27, may be obtained from the awards officer, Canadian Association of University Teachers, 66 Lisgar Street, Ottawa, Ontario K2P 0C1.

Resources for the Future Incorporated

The RFF Inc. offers annual doctoral dissertation fellowships of \$4,500 to assist qualified graduate students in completing doctoral dissertation work in the field of natural resources, and to stimulate their interest in the application of social science

disciplines to problems in the field of natural resources. Candidates must be nominated by the academic department in which they are doctoral candidates; direct applications are not accepted.

Nominees must have completed all requirements for the doctorate except the dissertation before the beginning of the 1981-82 academic year. Research must relate to natural resources, their products or services, and must involve the social sciences or related fields of study. Nominations must be received by February 1. Further details are available from the Graduate Studies and Research Office, or Resources for the Future Inc. Fellowship Program, 1755 Massachusetts Ave., N.W., Washington, D.C. 20036.

Canadian Advertising Advisory Board

Doctoral fellowships of up to \$4,000 are available for any approved research project in the economic and social aspects of advertising. These fellowships are open to any Canadian citizen or anyone residing in Canada working towards a doctoral degree. Candidates are expected to be at or near the dissertation stage. Applications, due before March 31, should be made to the director of awards, Canadian Advertising Advisory Board, 159 Bay Street, Toronto, Ontario.

Canada Department of Labour University Research Program

Grants ranging up to \$5,000 a year are provided for research studies in the field of industrial relations and labour economics. Applications are accepted from graduate students and university faculty members, provided they are Canadian citizens or can demonstrate they will be residing in Canada on a continuing basis. Further information and application forms are available from the Secretary, Department of Labour, University Research Committee, Economics and Research Branch, Canada Department of Labour, Ottawa, Ontario K1A 0J2. Applications must be received by February 15.

Canadian Wildlife Service Scholarships

The Canadian Wildlife Service offers Canadian citizens postgraduate scholarships, valued at \$2,500, to undertake or pursue postgraduate

studies in wildlife biology (excluding fishery resources) at Canadian universities during 1981-82.

Application forms are available in the Graduate Studies and Research Office. Deadline is March 1.

Awards for Research and Study in Mental Retardation

The National Institute on Mental Retardation offers two awards to students entering or pursuing graduate studies: Type A offers up to \$7,500 plus a travel/training award for a one-year period; Type B offers supplementary funding of up to \$2,000 per year for two years. The awards are tenable in a wide area of study, and are not limited to fields directly associated with mental retardation. The deadline for applications for Type A is February 19, and for Type B, April 15.

Franki Fellowship

This fellowship is offered to a graduate student in science, engineering, or agriculture at a Canadian university, to further the advancement of the science of soil mechanics in Canada; it carries a value of \$5,000. The university is responsible for the choice of candidates and must inform Franki Canada Limited, in writing, before April 15. Further information may be obtained from Franki Canada Limited, 1320 Graham Boulevard, Montreal, Quebec H3P 2C4.

Canada Student Loans Plan

For students who qualify, this plan makes interest-free loans available for post-secondary study. To be eligible for a Canada Student Loan, the applicant must be taking at least 60 percent of a full course load for a period of study of at least 26 weeks. The amount of loan is based on the student's calculated financial need.

Ontario Student Loans Plan

A student's application for OSAP assistance may be supplemented automatically by the Ontario Student Loans Plan if his/her calculated financial need is not fully covered by the Canada Student Loans Plan. This provincial loans plan also helps part-time students, or students enrolled in some short courses which are not covered by the other plans.

Students are not obliged to borrow the full amount of their authorized loan for either the Canada Student Loans Plan or the Ontario Student Loans Plan.

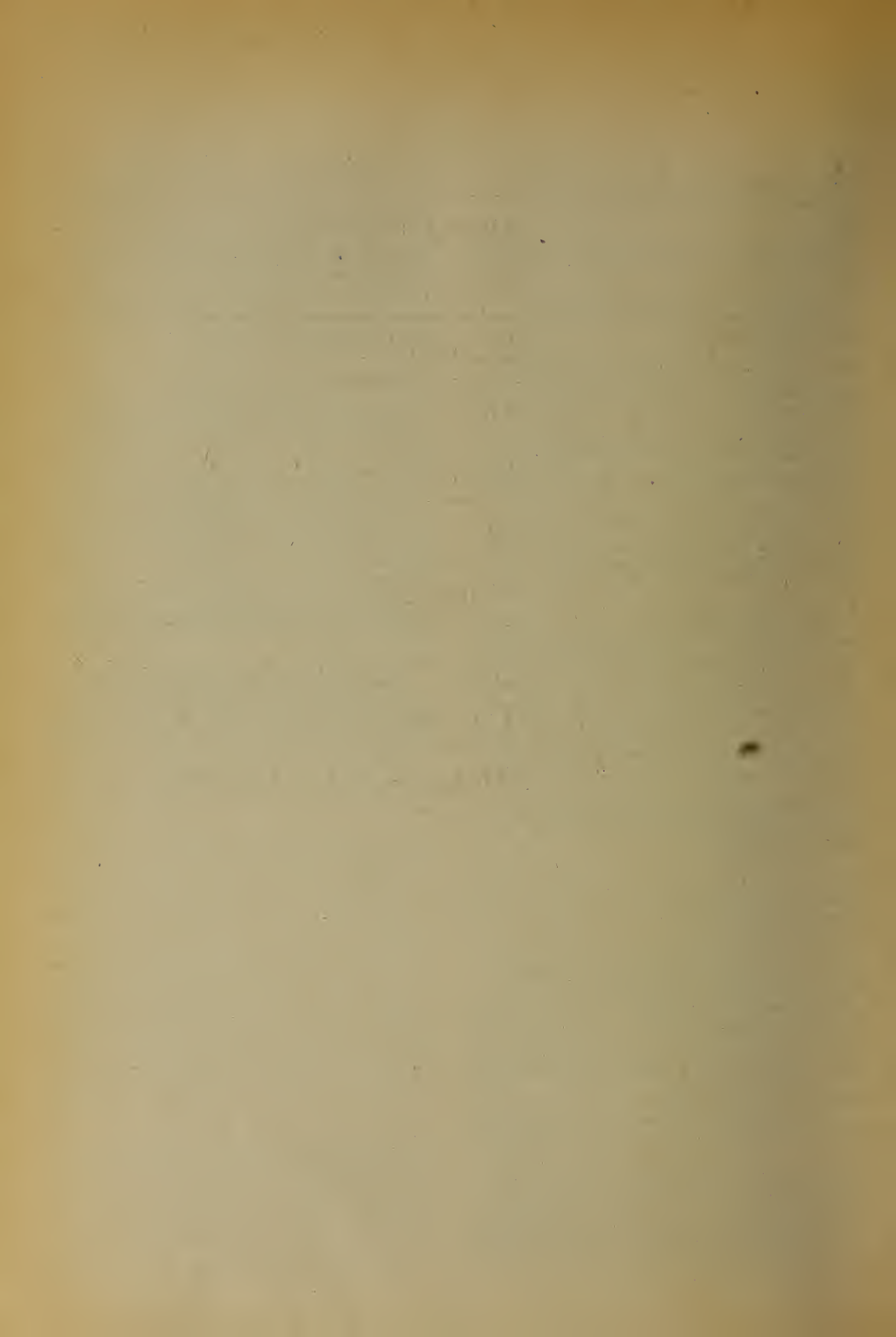
Application forms and a brochure containing details of the plan, including conditions of eligibility, may be obtained from the Awards Office.

Grants and Loans

Ontario Student Assistance Program

All students who are residents of Ontario, Canadian citizens or landed immigrants, and who satisfy the admission requirements of a Canadian university or an eligible post-secondary institution in Ontario may apply for assistance.

The Ontario Study Grant Plan provides grants to assist with post-secondary education for up to eight terms (or eight grant eligibility periods) of full-time study or its equivalent. Students continuing post-secondary study beyond the eight terms are eligible to apply for the Canada Student Loans Plan and the Ontario Student Loans Plan.



Departmental

Program

Descriptions

and

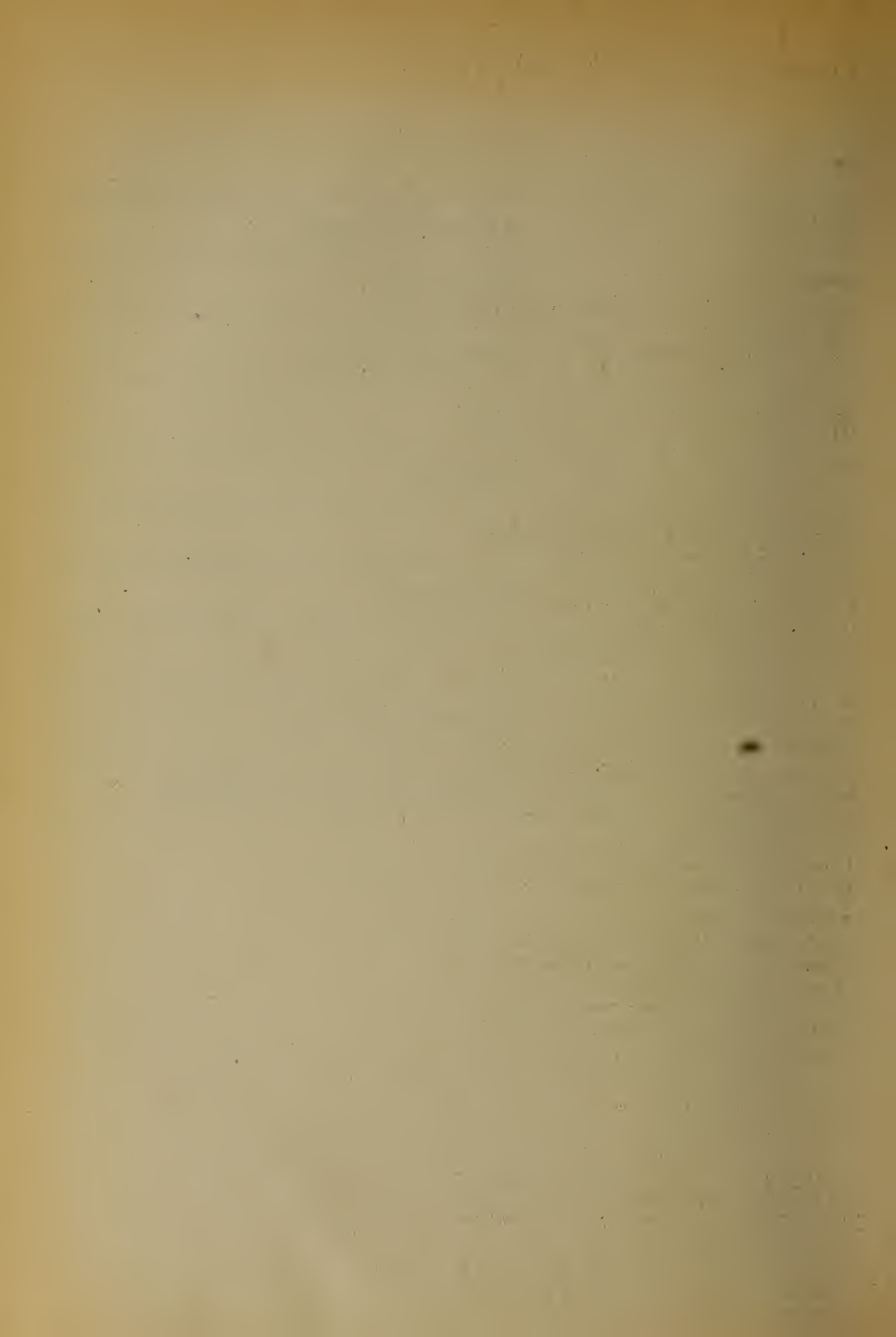
Details

of

Courses

Faculty of Arts

Dean: N.E.S. Griffiths



The Department

Chairman of the Department: David Goodreau

The Department of Art History offers two courses at the graduate level, under the aegis of the Institute of Canadian Studies.

Graduate Courses*

- Art History 11.505T2

Selected Aspects of Canadian Art History

A tutorial to study specific areas of Canadian art in the Pre-Confederation and Post-Confederation periods.

Prerequisite: Honours courses in art history or permission of the department.

Departmental co-ordinator and members of the curatorial staffs, National Museums of Canada.

- Art History 11.506F1, W1, S1

Directed Reading and Research

Tutorials designed to permit advanced students to pursue topics in Canadian art which they have selected in consultation with the staff.

Prerequisite: Permission of the department and the Institute of Canadian Studies.

Departmental co-ordinator and members of the curatorial staffs, National Museums of Canada.

- Art History 11.507F1

Selected Aspects of Contemporary Inuit Art

This seminar is designed to study the problems of Inuit artists and their art in contemporary Canadian society, in relation to acculturation, identity crisis and cultural self-affirmation.

George Swinton.

*F, W, S indicates term of offering.

Courses offered in the fall *and* winter (or any other two terms) will be followed by T.

The number following the letter indicates the credit weight of the course: 1 denotes a half-course credit, 2 denotes a full-course credit, etc.

Institute of Canadian Studies

The Institute

Director of the Institute and General Editor,

Carleton Library: S.F. Wise

Assistant Director: R.A. Whitaker

Visiting Fellow: Davidson Dunton

Research Professor: L.M. Read

The Institute of Canadian Studies offers programs of study and research leading to the degree of Master of Arts in Canadian Studies.

Through the medium of the institute, the following departments co-operate in offering the programs: Art History, Economics, English, Film Studies, French, Geography, History, Journalism, Law, Linguistics, Music, Political Science, Psychology, Public Administration, Social Work, and Sociology/Anthropology.

The Canadian studies program is interdisciplinary in emphasis. It enables students in the institute to develop individual programs to meet particular interests in a broad range of Canadian issues.

Among special areas in which it is possible to build individual programs are: *communications; regional studies; urban studies; French-Canadian studies; native peoples; Canadian art history and music; and studies in Canadian literature.*

The proximity of Carleton University to the National Library, the Library of Parliament, the Public Archives of Canada, Statistics Canada, and the libraries of various government departments and embassies, ensures excellent research facilities for graduate candidates in Canadian studies.

The Institute of Canadian Studies sponsors and gives editorial supervision to the Carleton Library, a series of paperback reprints and compilations of classic material relating to Canadian history, law, economics, politics, anthropology, sociology, geography and journalism. There are 125 volumes to date.

A new series, Carleton Contemporaries, launched in 1968, consists of original monographs and compilations focusing on the issues of the day — political, social, economic and cultural.

Further information may be obtained by writing directly to the institute.

Qualifying Year Program

Applicants with general (pass) Bachelor's degrees with second-class standing will be required to complete successfully a Qualifying Year of study before proceeding to the Master's program.

Refer to the general section of this calendar for the regulations governing the Qualifying Year.

Master of Arts

Admission Requirements

Applicants must normally hold an Honours B.A. (or the equivalent), with at least high second-class standing, in one of the disciplines represented in the institute.

Language Requirement

The institute requires a reading knowledge of French from its students. This requirement may be met in one of two ways:

- Successful completion of a 100-level French course or its equivalent, preferably French 20.106 or 20.108
- Successful completion of a language examination.

The institute conducts the language examinations at stated times throughout the year. Students choosing the first option should note that examination results in these courses form part of their record, although they are additional to the course requirements for the degree.

Program Requirements

The minimum requirements for the Master's program are outlined in the general section of this calendar. The Institute of Canadian Studies specifies that all candidates must select one of the following program patterns:

- Three full courses or the equivalent, a thesis and an oral examination
- Four full courses or the equivalent, a research essay and an oral examination.

Whichever pattern is selected, all institute students are required to take the interdisciplinary seminar, Canadian Studies 12.500.

Graduate Courses*

- Canadian Studies 12.500T2
Modern Concepts of Canada
Interdisciplinary seminar.
Sections of this seminar will be led by L.M. Read
and S.F. Wise.
- Canadian Studies 12.590T2, S2
Directed Studies
Reading and research tutorials.
- Canadian Studies 12.591F1, W1, S1
Directed Studies
Reading and research tutorials.
- Canadian Studies 12.592T2, S2
Directed Studies
Reading and research tutorials.
- Canadian Studies 12.593F1, W1, S1
Directed Studies
Reading and research tutorials.
- Canadian Studies 12.598F2, W2, S2
Research Essay
- Canadian Studies 12.599F4, W4, S4
M.A. Thesis

Selection of Courses

In addition to the graduate courses offered by the institute, the following courses are open to students in Canadian studies. Master's students in the institute must complete at least four courses or the equivalent at the 500 level, with the possibility of one course at the 400 level. The list is subject to change.

Anthropology

- 54.516 Selected Topics in North American Studies

*F,W,S indicates term of offering.

Courses offered in the fall and winter (or any other two terms) will be followed by T.

The number following the letter indicates the credit weight of the course; 1 denotes a half-course credit, 2 denotes a full-course credit, etc.

Art History

- 11.400 Canadian Artists and Architects
11.403 Contemporary Inuit Art in the Context of Art History
11.490 Directed Readings and Research
11.491 Directed Readings and Research
11.505 Selected Aspects of Canadian Art History
11.506 Directed Readings and Research

Economics

- 43.435 Manpower Economics and Labour Policy
43.465 Industrial Relations
43.480 Urban Economics
43.511 Canadian Economy I
43.512 Canadian Economy II
43.531 Firms and Markets
43.532 Competition Policy
43.533 Regulation and Public Enterprise
43.541 Public Economics: Expenditure
43.542 Public Economics: Taxation
43.581 Regional Analysis
43.582 Urban Analysis

English

- 18.483 Seminar in Canadian Fiction
18.487 Special Topic in Canadian Literature
18.583 Canadian Fiction
18.585 Canadian English
18.587 Selected Topic in Canadian Literature

Film Studies

- 19.528 Canadian Cinema

French

- 20.463 Aspects de la littérature
20.511 Auteurs, œuvres, thèmes: Octave Crémazie et Louis Fréchette
20.521 Courants, mouvements, écoles: Naissance et évolution de la critique littéraire au Canada français (1840-1970)
20.541 Sémiotique, poétique, rhétorique
20.551 Critique sociologique et idéologique

Geography

- 45.421 Selected Themes in Urban Geography
45.442 Transportation Geography
45.546 Geographical Insights to Canadian Problems
45.570 Problems of Development in Arctic and Subarctic Environments
45.572 Issues in Canadian Resource Development
45.579 Research and Development in Recreational Geography

History

- 24.430 The Formation of British North American Societies, 1760-1848
- 24.431 The Making of the Nation, 1849-1896
- 24.432 The National Experience, 1896-1939
- 24.433 Modern Canada, 1939-1967
- 24.442 North American Colonial Rebellions and Independence Movements, 1675-1837
- 24.491 Directed Studies
- 24.500 A Practicum in Applied History
- 24.537 The Maritimes in Transition, 1840's to 1890's
- 24.538 The Indian Peoples of Eastern British North America, 1763-1867
- 24.539 Acadian Society, 1604-1967
- 24.588 Historiography

Journalism

- 28.411 Selected Problems in Mass-Communication Analysis
- 28.434 Media and Society I
- 28.435 Media and Society II
- 28.461 Perspectives on Modern Society
- 28.462 Public Issues in Canada
- 28.530 Mass Media/Mass Society
- 28.532 Press and Government

Law

- 51.441 Labour Law
- 51.445 Labour Relations in the Public Service
- 51.450 Canadian Constitutional Law
- 51.456 Administrative Law I
- 51.457 Administrative Law II
- 51.550 The Canadian Constitution
- 51.553 Advanced Legal Problems of Federalism
- 51.555 Advanced Administrative Law Problems
- 51.590 Tutorials/Directed Readings in Law

Music

- 30.510 History of Canadian Music I
- 30.511 History of Canadian Music II
- 30.512 History of Canadian Music III

Political Science

- 47.400 Topics in Canadian Government and Politics
- 47.401 Policy Making in Canada
- 47.402 Problems in Northern Development
- 47.403 Politics and the Media

- 47.404 Interest Groups in Canadian Politics
- 47.405 Federalism
- 47.406 Legislative Process in Canada
- 47.407 The Politics of Law Enforcement in Canada
- 47.408 National Security and Intelligence in the Modern State
- 47.409 French-Canadian Politics
- 47.500 Canadian Local Government and Politics
- 47.501 Canadian Provincial Government and Politics
- 47.503 Political Parties in Canada
- 47.506 Problems of Canadian Government and Politics: I
- 47.507 Problems of Canadian Government and Politics: II
- 47.508 The Politics of Energy and the Environment
- 47.509 Canadian Political Economy
- 47.510 The Political Process in Canada
- 47.511 Canadian Federalism
- 47.520 Nationalism
- 47.535 The Canadian and American Political Traditions
- 47.540 Canadian Public Administration and Policy Analysis
- 47.561 Analysis of Canadian Foreign Policy
- 47.588 International Political Economy

Psychology

- 49.590 Directed Study

Public Administration

- 50.500 Public-Sector Managing and the Canadian Political System
- 50.515 Management in the Public Service
- 50.516 Urban and Local Government Management
- 50.567 Public Sector-Private Sector Relations
- 50.565 Government-Industry Policy Relations
- 50.573 Policy Seminar
- 50.584 Industrial Relations and Collective Bargaining
- 50.585 Public-Sector Collective Bargaining

Social Work

- 52.502 Economics of Welfare
- 52.504 Social Work and the Law
- 52.510 History and Philosophy of Social Welfare
- 52.511 Social Policy Analysis
- 52.514 Housing Policy
- 52.515 Poverty and Wealth
- 52.517 Social Policies for Children
- 52.544 Program Implementation Analysis

Sociology

- 53.525 Canadian Society
- 53.545 Power and Stratification

Department of Classics

The Department

Chairman of the Department: D.G. Beer
Departmental Supervisor of Graduate Studies:
A.S. Fotiou

The Department of Classics offers programs of study leading to the degree of Master of Arts. The following three program categories are available:

- Classics
- Greek only
- Latin only
- Ancient History

Qualifying Year

Applicants who hold a general (pass) B.A. degree will normally be required to complete successfully a Qualifying Year program before proceeding to the Master's program. Refer to the general section of this calendar for the regulations governing a Qualifying Year.

Program Requirements

The Qualifying Year program will correspond quite closely to the final year of the Honours undergraduate program offered by the Department of Classics, although it may include graduate courses.

Master of Arts

Admission Requirements

The minimum requirement for admission to the Master's program is an Honours B.A. degree in classical civilization, ancient history, classics, Latin, or Greek.

Program Requirements

The regulations governing program requirements are outlined in the general section of this calendar. Master's students will normally be required to complete three full courses (or the equivalent) at the 500 level, and a thesis equivalent to two full courses.

The department also specifies the following:

- Students entering the program with a degree in classical civilization must have a knowledge of

Latin or Greek to the level of 16.151 or 15.151 (or the equivalent) and the other of the two languages to the level of 16.115 or 15.115 (or the equivalent). In special circumstances, the department will allow a student to enter the Master's program with less than these requirements, but in that case, the student will have to reach the necessary standard before graduation.

- Students taking the degree in Greek only must have credit in senior matriculation Latin or an approved equivalent; those in Latin only must have credit in Greek 15.115 (or the equivalent).
- All students must demonstrate a knowledge of German. Credit in German 22.115, or an approved equivalent, will be accepted.

Graduate Courses*

- Classics 14.505F1
Introduction to Linguistics
- Classics 14.506W1
Elementary Textual Criticism
- Classics 14.520T2
A Greek Author
- Classics 14.521T2
A Latin Author
- Classics 14.530T2
A Greek Literary Genre
- Classics 14.531T2
A Latin Literary Genre
- Classics 14.550T2
A Greek Historical Period
- Classics 14.551T2
A Roman Historical Period
- Classics 14.552T2
A Topic in Greek and Roman History
- Classics 14.599F4, W4, S4
M.A. Thesis

*F,W,S indicates term of offering.
Courses offered in the fall *and* winter (or any other two terms) will be followed by T.

The number following the letter indicates the credit weight of the course: 1 denotes a half-course credit, 2 denotes a full-course credit, etc.

The Committee

Chairman of the Committee: Stéphane Sarkany

The Comparative Literature Committee offers programs of graduate study leading to the degree of Master of Arts. These programs, involving courses in comparative literature and, where appropriate, up to two courses from other departments, have considerable flexibility in the sense that they can be tailored to suit each student's special interests in particular periods or areas while, at the same time, through the core course 17.500 and the final comprehensives, providing a specialized training in the techniques of comparative literature.

The purpose of the comparative literature program is to study literature in its international context, and to relate and compare literary phenomena usually studied in isolation because of linguistic barriers and the traditional departmental division of academic disciplines. Thus, taking into account the interrelation of all humanistic studies, such as the various literatures, philosophy, psychology, sociology, the visual arts and history, "comparatists" view literary creation within the total complex evolution of world literature. The historical flow of literary archetypes, the role of folklore and myth in literature, recurrent problems of literary theory, and consideration of the less well-known literatures of the world are some of the objects of comparative literature studies.

The study of this discipline must be based on a truly comparative perspective, on a solid linguistic foundation, and on an awareness of all difficulties that arise in comparative literature, conceived as a domain both within and beyond the limits of national literatures.

Students registered in other language departments, who wish to register in one or more courses from the comparative literature program, must demonstrate a reading knowledge of the languages required for each course. Three years of study at the university level will normally constitute the required level of language proficiency.

Qualifying Year Program

Applicants who hold only a general (pass) B.A. degree will be required to complete successfully the following basic course and to take courses from other departments of literature, or comparative literature (see undergraduate calendar) to achieve the equivalent of a combined Honours B.A.:

- Comparative Literature 17.400
Analytical Approaches to Literature

The total course program is to be worked out in consultation with the graduate studies supervisor. Formal admission to the Master's program may be considered at the end of the first term.

Master of Arts

Admission Requirements

The regulations governing admission to the Master's program are outlined in the general section of this calendar.

The specific requirements for admission to the Master's program in comparative literature are the following:

- An Honours B.A. degree (or the equivalent) with at least high second-class standing, including two full courses in literature at the senior undergraduate level in each of the two language fields (studied in the original language); candidates who hold degrees in only one national literature, or in the humanities or social sciences, will be required to take additional courses or to register in the Qualifying Year program.
- In addition to proficiency in English, students should have a comprehensive knowledge of either French or German (including the ability to read primary and secondary sources in that language, and to participate occasionally in class discussions in that language).
- A reading knowledge of at least one additional language from among the following: French, German, Spanish, Italian, Russian, Latin, or classical Greek; in special cases, the committee may permit the substitution of some other language. Students accepted into the program who

lack this reading knowledge will be required to demonstrate that they have reached the appropriate level before completing the program and receiving the M.A.

Program Requirements

Students accepted into the Master's program without having taken 17.400 (or its equivalent) will be required to take this course as extra to the degree.

The program requirements for Master's candidates in comparative literature are the following:

- Comparative Literature 17.500

Theory of Literature and Standard Problems in Comparative Literature

- *One of the following two combinations:*

Three graduate courses selected from those offered by comparative literature and other departments; (one 400-level course may be substituted for a graduate course) *or*

Comparative Literature 17.599: M.A. Thesis, plus one graduate course

- Comparative Literature 17.593F2, W2, S2
Comprehensives in Comparative Literature (written and oral).

Course Patterns

Certain course patterns based on offerings by comparative literature and other departments have been drawn up for 1981-82. Students can choose their course options from:

Theories and Techniques of Analysis (Co-ordinator: H.-G. Ruprecht)

- 17.506 (Comparative Literature) Styles and Periods: La littérature, le rire et la satire
- 17.525 (Comparative Literature) Literary Movements in the Nineteenth and Twentieth Centuries: Intertextuality: Literature and the Theory of Cultural Codes
- 17.561 (Comparative Literature) Studies in Literary Genres: Concepts of Criticism
- 17.591 (Comparative Literature) Literary Structural Studies of the Deuteronomic History
- 11.487 (Art History) Theory of Art Criticism
- 19.468 (Film Studies) Problems in Film Theory and Aesthetics

20.551 (French) Critique sociologique et idéologique: Spiritualisme et matérialisme dans l'écriture moderne

54.508 (Anthropology) Structuralism

Semiotics (Co-ordinator: H.-G. Ruprecht)

- 17.506 (Comparative Literature) Styles and Periods: La Littérature, le rire et la satire
- 17.525 (Comparative Literature) Literary Movements in the Nineteenth and Twentieth Centuries: Intertextuality: Literature and the Theory of Cultural Codes
- 17.591 (Comparative Literature) Literary Structural Studies of the Deuteronomic History
- 11.487 (Art History) Theory of Art Criticism
- 19.468 (Film Studies) Problems in Film Theory and Aesthetics
- 20.409 (Linguistics) Seminar in Current Issues in Linguistics: Aspects of Semiotics
- 54.508 (Anthropology) Structuralism

Myth and Archetype (Co-ordinator: Massimo Ciavolella)

- 17.507 (Comparative Literature) Study of a Theme or Motif: The Tristan Theme in Modern Literature
- 17.510 (Comparative Literature) Special Topic in Modern Fiction: Les Métamorphoses des "Métamorphoses"
- 17.530 (Comparative Literature) The Modern Ulysses: The Myth of the Return in Twentieth-Century Fiction
- 20.551 (French) Critique sociologique et idéologique: Spiritualisme et matérialisme dans l'écriture moderne
- 47.432 (Political Science) Contemporary Marxism
- 54.508 (Anthropology) Structuralism

Literature of the Americas (Co-ordinator: C.A. Marsden)

- 18.571 (English) American Poetry: A Study of Selected American Poets
- 18.576 (English) American Literature: A Study of a Selected Topic in American Literature
- 18.583 (English) Canadian Fiction: A Study of Selected Canadian Novels
- 18.587 (English) Selected Topic in Canadian Literature: A Study of a Selected Topic (to be announced)

20.521 (French) Courants, mouvements, écoles: Naissance et évolution de la critique littéraire au Canada français (1840-1970)

38.491 (Spanish) Twentieth-Century Spanish-American Theatre

Medieval (Co-ordinator: José Jurado)

Not offered in 1981-82

Renaissance and Baroque (Co-ordinator: Joseph Dallett)

17.590 (Comparative Literature) The Use of History in Renaissance Literature

18.534 (English) Renaissance Drama: A Study of Selected Renaissance Plays

38.520 (Spanish) Special Topic on Golden Age Literature: The Picaresque Novel

38.550 (Spanish) Aspects of Spanish-American Literature before 1888: Baroque Drama

Enlightenment, Romanticism and Realism

(Co-ordinator: S.C. Russell)

Not offered in 1981-82

Modern Literature: Poetry (Co-ordinator: Pierre Laurette)

17.525 (Comparative Literature) Literary Movements in the Nineteenth and Twentieth Centuries: Intertextuality: Literature and the Theory of Cultural Codes

18.551 (English) Nineteenth-Century Poetry: A Study of Selected Poets of the Nineteenth Century

38.530 (Spanish) Problems of Modern Spanish Literature: Post-Romantic Poetry

Modern Literature: Prose (Co-ordinator: Stéphane Sarkany)

17.530 (Comparative Literature) The Modern Ulysses: The Myth of the Return in Twentieth-Century Fiction

18.568 (English) Twentieth-Century Studies: A Study of a Selected Theme or Topic in Twentieth-Century British Fiction

20.531 (French) Genres: Flaubert romancier. Analyses discursives et narratologiques

20.551 (French) Critique sociologique et idéologique: Spiritualisme et matérialisme dans l'écriture moderne

36.430 (Russian) Tutorial, Special Topic: Literature

38.430 (Spanish) Modern Spanish Novel

Modern Literature: Drama (Co-ordinator: Angel López-Fernández)

18.534 (English) Renaissance Drama: A Study of Selected Renaissance Plays

26.410 (Italian) Italian Theatre from Goldoni to Pirandello

36.440 (Russian) Tutorial, Special Topic: Drama

38.491 (Spanish) Twentieth-Century Spanish-American Theatre

38.570 (Spanish) Special Problems in Spanish-American Literature: The Grotesque and the Absurd in Twentieth-Century Argentine Theatre

Canadian Literature in Multicultural Context

(Co-ordinator: Massimo Ciavolella)

17.596 (Comparative Literature) The Folk Tale in Canada

18.583 (English) Canadian Fiction: A Study of Selected Canadian Novels

18.587 (English) Selected Topic in Canadian Literature: A Study of a Selected Topic (to be announced)

20.511 (French) Octave Crémazie et Louis Fréchette. Étude de la première éclosion d'une littérature de langue française au Canada

20.521 (French) Courants, mouvements, écoles. Naissance et évolution de la critique littéraire au Canada français (1840-1970)

30.512 (Music) Canadian Music of the Early Twentieth Century

47.521 (Political Science) Politics in Multicultural Societies

Literatures of Small Language Areas (Co-ordinator: Stéphane Sarkany)

Not offered in 1981-82

The Third World: Selected Areas (Co-ordinator: V.K. Chari)

17.561 (Comparative Literature) Studies in Literary Genres: Concepts of Criticism

38.550 (Spanish) Aspects of Spanish-American Literature before 1888: Baroque Drama

38.560 (Spanish) Aspects of Spanish-American Literature after 1888: Experimental Fiction in Spanish America

38.570 (Spanish) Special Problems in Spanish-American Literature: The Grotesque and the Absurd in Twentieth-Century Argentine Theatre

Social, Cultural and Political Function of Literature
(Co-ordinator: Stéphane Sarkany)

20.551 (French) Critique sociologique et idéologique: Spiritualisme et matérialisme dans l'écriture moderne

47.432 (Political Science) Contemporary Marxism

47.521 (Political Science) Politics in Multi-cultural Societies

53.585 (Sociology) Sociology of Language

In all cases, the committee will prescribe a program of studies that will complement the student's background and special interest.

Graduate Courses*

A prerequisite for all graduate-level courses is appropriate linguistic ability and approval of the Comparative Literature Committee.

- Comparative Literature 17.400

Analytical Approaches to Literature

Topic for 1981-82: The Literatures of 1900:

Symbols of Individual and Social Change

The course is divided into four basic components dealing, at an introductory level, with the linguistic, aesthetic, sociological, and historical approaches to literature.

Prerequisite: Permission of the committee.

- Comparative Literature 17.500T2, S2

Theory of Literature and Standard Problems

Topic for 1981-82: Aspects of European and American Modernity

Comparative studies in late nineteenth-century and twentieth-century drama, novel and poetry, centered upon the question "what was/is 'modern' literature?", with textual analysis in the light of contemporary literary theories. This includes problems such as periodization of international movements, investigation of cultural codes in relationship to formal devices, and modes of text production and reception.

Prerequisite: Permission of the committee.

*F,W,S indicates term of offering.

Courses offered in the fall and winter (or any other two terms) will be followed by T.

The number following the letter indicates the credit weight of the course: 1 denotes a half-course credit, 2 denotes a full-course credit, etc.

- Comparative Literature 17.506T2

Styles and Periods

Topic for 1981-82: La Littérature, le rire et la satire

Les modèles textuels de la parodie, du pastiche, de l'œuvre "travestie", et de la caricature. Importance de la fonction sociale de ces modes d'expression en littérature. Auteurs: Rabelais, Cervantes, Scarron, L. Sterne, Proust.

Prerequisite: Permission of the committee.
Pierre Laurette.

- Comparative Literature 17.507T2

Study of a Theme or Motif

Topic for 1981-82: The Tristan Theme in Modern Literature

This course will examine how nineteenth and twentieth-century German, English, and French authors employ the Tristan-Isolde legend to explore the human psyche and to comment on their respective societies. Works to be considered will include Wagner's opera *Tristan und Isolde*, Tristan works by Thomas Mann, G. Kaiser, Tennyson and Swinburne, and Cocteau's film *L'Eternel Retour*.

Prerequisite: Permission of the committee.
G.A. Woods.

- Comparative Literature 17.510T2

Special Topic in Modern Fiction

Topic for 1981-82: Les Métamorphoses des "Métamorphoses"

Ovide a rassemblé dans son ouvrage des traditions mythologiques de l'antiquité qui vont de l'origine du monde à l'empire romain. De très nombreux écrivains modernes ont repris des thèmes des "Métamorphoses". Ce cours étudierait certains récits d'Ovide et examinerait comment ils ont été transformés au cours de l'histoire littéraire.

Prerequisite: Permission of the committee.
Pierre van Rutten.

- Comparative Literature 17.525T2

Literary Movements in the Nineteenth and Twentieth Centuries

Topic for 1981-82: Intertextuality: Literature and the Theory of Cultural Codes

An investigation of intertextual relations in poetry, drama, and fiction, within the framework of modern cultural codes. Topics include the identification of semiotic ties that hold between literature and other arts. Emphasis is put on twentieth-

century texts from Apollinaire's "Calligrammes" to "Monsieur Melville" by VLB, with special attention to the works of T.S. Eliot, Borges, Thomas Mann, and Peter Weiss.

Prerequisite: Permission of the committee.
H.-G. Ruprecht.

- Comparative Literature 17.530F1, W1
Literary Archetypes
Topic for 1981-82: The Modern Ulysses: The Myth of the Return in Twentieth-Century Fiction
This course would examine the literary import of a variation of the voyage theme; it therefore (the voyage connecting visibly to such notions as plot and fabula) has a high theoretical content. It sets a terminal of the voyage, the city, and the country. A good portion of the course would be devoted to a discussion of the development of anthropology and its relation to fiction.

Prerequisite: Permission of the committee.
F.G. Loriggio.

- Comparative Literature 17.561T2
Studies in Literary Genres
Topic for 1981-82: Concepts of Criticism
A course in literary aesthetics, designed to examine the nature of literature and of critical discourse by comparing Western and Indian theories. Course of study: the problem of definition, the concept of imitation, truth in literature, poetry, and the emotions, poetic meaning, the concept of style, and of genres, form in literature, the logic of interpretations, and the concept of propriety.

Prerequisite: Permission of the committee.
V.K. Chari.

- Comparative Literature 17.591F1
Ideology and Values of Modernity
Topic for 1981-82: Literary Structural Studies in the Deuteronomic History
This seminar assumes the unity of Deuteronomy — 2 Kings, and will attempt to describe key features of its framework. This will involve a synchronic study, unencumbered by prior diachronic assumptions, and directed toward a compositional analysis. Russian literary critics such as M. Bakhtin and B. Uspensky will provide a theoretical basis for this approach.

Prerequisite: Permission of the committee.
R.M. Polzin.

- Comparative Literature 17.593F2, W2, S2
Comprehensives

- Comparative Literature 17.596F1, W1
Directed Special Studies
Topic for 1981-82: The Folk Tale in Canada
André Elbaz.

- Comparative Literature 17.598T2
Directed Special Studies
From time to time, students whose main interests are not covered by courses offered in a given year may pursue independent research, subject to the availability of a qualified adviser and relevant library resources at Carleton. Interested students should apply directly to the supervisor of graduate studies.

- Comparative Literature 17.599F4, W4, S4
M.A. Thesis

Courses Not Offered in 1981-82

17.505 Translation Workshop

17.597 Directed Special Studies: Aspects of Modern Dutch Literature

Department of English Language and Literature

The Department

Chairman of the Department: M.I. Cameron
Departmental Supervisor of Graduate Studies:
A.D. McLay

The Department of English offers programs of study leading to the M.A. and Ph.D. degrees in English Language and Literature. Additional information may be obtained by consulting the departmental supervisor of graduate studies.

Qualifying Year Program

Applicants who hold a general (pass) B.A. degree with at least B standing, with a major in English language and literature, may be admitted to the Qualifying Year program. Normally, these students will be required to complete four or five full courses (or the equivalent) in English as determined by the department, and to maintain at least a B- average in the Qualifying Year courses, before being considered for admission into the Master's program.

Master of Arts

Admission Requirements

The minimum admission requirement for the Master's program is an Honours B.A. (or the equivalent) in English Language and Literature, with at least high second-class standing and including at least five of the following areas:

- History of the English Language or General English Linguistics
- Old English or Middle English
- Renaissance Literature
- Drama (including Shakespeare)
- Restoration and Eighteenth-Century Literature
- Romantic and Nineteenth-Century Literature
- Twentieth-Century Literature
- Canadian Literature

Possession of the minimum entrance standing is not in itself, however, an assurance of admission into the program.

Program Requirements

Each candidate will select one of the following optional program patterns:

- Three full courses (or the equivalent) in English, including English 18.597: Special Topic Studies, selected from those offered at the 500 level (except 18.598) and a Master's thesis; an oral examination on the thesis and related fields will also be undertaken.
- Five full courses (or the equivalent) in English, including English 18.598: Directed Special Studies, selected from those offered at the 500 level (except 18.597).

Under certain conditions, one of the optional courses in either program pattern may be selected from those offered by the department at the senior undergraduate level in a field for which no graduate course is available. One of the optional courses may also be a cognate course at the graduate or the senior undergraduate level, offered by another department. However, not more than one undergraduate course may be included in the total program.

All candidates are required to demonstrate a reading knowledge of one language other than English, approved by the department.

Academic Standing

A standing of B- or better must be obtained in each course counted towards the Master's degree.

Doctor of Philosophy

A Ph.D. program specializing in Canadian literature has been offered since 1979-80. It requires three years of full-time study with the residence requirement satisfied at the end of the second year.

Admission Requirements

A Master's degree in English language and literature, with high second-class standing or better, will be required for admission. A solid background in the English literary tradition will be assumed, but in particular, applicants should show evidence of competence in certain periods or fields. These should include Canadian Literature (a minimum

of one course at the graduate level) and four of the following: Eighteenth Century; Romantic; Victorian; Nineteenth-Century American; Nineteenth- or Twentieth-Century French; Twentieth-Century British and American; History of Criticism; the Literatures of the Commonwealth.

Program Requirements

French Language

A thorough knowledge of French, including both reading and aural comprehension, will be required of all applicants. A test consisting of a one-hour oral examination on selected passages of French-Canadian prose and poetry will be administered soon after the student is formally admitted to the program, and the candidate will at the same time be required to produce a written translation of selected passages of French-language literary criticism.

Courses

The doctoral program requires two years of course work, a total of five credits earned in five compulsory courses at the 600 level. Candidates will normally take three courses in the first year: English 18.681, English 18.683 and English 18.687; in the second year English 18.680 and English 18.688. In special circumstances, with the approval of the graduate studies committee, a candidate may replace one course with a course in another department at either the 500 or 600 level.

Comprehensive Examination

On the completion of the course work, each candidate will be examined comprehensively in the field of Canadian literature and its contexts in two written papers of three hours each. An oral examination, two hours in length, will probe the written papers and assess the candidate in an area of concentration within the field of Canadian literature.

The area of concentration may be related to, but will not be identical with, the candidate's thesis topic. Three months before the date of the comprehensive examination, the candidate will submit to the supervisor of graduate studies, for departmental approval, a proposal for his/her area of concentration. The submission will include a bibliography of sources considered relevant to the area.

Thesis

Each candidate will submit a thesis and defend it in an oral examination; procedures outlined by the Faculty of Graduate Studies and Research will apply. The candidate's third year will normally be reserved for the researching and writing of the thesis. Completed, this work will have the weight of five full credits.

Graduate Courses*

- English 18.500T2
Literary Criticism
A study of specific topics or particular areas of literary criticism.
- English 18.532F1
Seventeenth-Century Poetry
A study of selected seventeenth-century poets.
- English 18.534S1
Renaissance Drama
A study of selected Renaissance plays.
- English 18.542W1
Eighteenth-Century Prose and Poetry
A study of selected authors in the Restoration and eighteenth century.
- English 18.551T2
Nineteenth-Century Poetry
A study of selected poets of the nineteenth century.
- English 18.563T2
Twentieth-Century Fiction
A study of selected twentieth-century novelists.
- English 18.566S1
Twentieth-Century Literature
A study of a selected theme or topic in twentieth-century literature.

*F,W,S indicates term of offering.
Courses offered in the fall *and* winter (or any other two terms) will be followed by T.

The number following the letter indicates the credit weight of the course: 1 denotes a half-course credit, 2 denotes a full-course credit, etc.

- English 18.567F1

Selected Twentieth-Century Authors
A study of a major British author.

- English 18.568W1

Twentieth-Century Studies
A study of a selected theme or topic in twentieth-century British fiction.

- English 18.571T2

American Poetry
A study of selected American poets.

- English 18.576S1

American Literature
A study of a selected topic in American literature.

- English 18.583T2

Canadian Fiction
A study of selected Canadian novels.

- English 18.585W1

Canadian English
A study of the English language and its varieties in Canada.

- English 18.587T2

Selected Topic in Canadian Literature
A study of a selected topic in Canadian literature.

- English 18.597T2, S2

Special Topic Studies
All thesis students will be assigned to an adviser (normally their thesis supervisor) for special tutorials in the general area of their thesis research.

- English 18.598T2, S2

Directed Special Studies
All students in the M.A. course program will be assigned to an adviser who will direct their area of special studies, preparing them for an oral examination in that area.

- English 18.599F4, W4, S4

M.A. Thesis

- English 18.681T2

Studies in Canadian Literature I (Poetry)
Selected authors in Canadian poetry and drama written both before and after World War I, and in both English and French, will be studied in depth.

- English 18.683T2

Studies in Canadian Literature II (Fiction)
Selected authors in Canadian fiction and other prose written both before and after World War I, and in both English and French, will be studied in depth.

- English 18.687T2

Studies in Scholarship
Bibliography, editing and research, as these relate to Canadian literature. Maximum use will be made of manuscripts and other primary documents.

- English 18.699F10, W10, S10

Ph.D. Thesis

Undergraduate Courses

Graduate students may take *one* of their courses at the senior undergraduate level.

Other Disciplines

Graduate students may take *one* of their five courses in a related discipline. The following courses may be of special interest:

Comparative Literature

17.400 Analytical Approaches to Literature

17.500 Theory of Literature and Standard Problems in Comparative Literature

17.561 Concepts of Criticism

17.590 The Use of History in Renaissance Literature

Courses Not Offered in 1981-82

18.518 Old Norse

18.521 Middle-English Poetry

18.522 Middle English

18.527 Selected Medieval Authors

18.528 Middle-English Studies

- 18.531 Renaissance Poetry
- 18.536 Renaissance Literature
- 18.537 Selected Renaissance Authors
- 18.538 Renaissance Studies
- 18.543 The Eighteenth-Century Novel
- 18.548 Studies in Romanticism
- 18.553 Nineteenth-Century Fiction
- 18.558 Studies in Nineteenth-Century Literature
- 18.561 Twentieth-Century Poetry
- 18.564 Twentieth-Century Drama
- 18.573 American Fiction
- 18.578 Studies in American Fiction
- 18.581 Canadian Poetry
- 18.588 Studies in Canadian Literature
- 18.590 Selected Topic
- 18.594 Special Studies in Dramatic Literature
- 18.680 Literary Criticism in Canada
- 18.688 Comparative and Contextual Studies

Department of Film Studies

The Department

Chairman of the Department: C.G. Faulkner

Film Studies does not offer a program of studies at the graduate level, but does offer a course at the graduate level, under the aegis of the Institute of Canadian Studies.

Graduate Courses*

- Film Studies 19.528T2

Canadian Cinema

Through a close analysis of films from both cultures, this course should establish the distinctly Canadian modes our cinema has developed. Special attention will be paid to the similarities and differences between English Canada and Québec, relating them both to the economic and political realities of our country and to the variety of thematic orderings of Canadian culture that can be found now in the writings of Northrop Frye, Margaret Atwood, Ronald Sutherland, Robin Mathews, John Moss and others.

*F,W,S indicates term of offering.

Courses offered in the fall *and* winter (or any other two terms) will be followed by T.

The number following the letter indicates the credit weight of the course: 1 denotes a half-course credit, 2 denotes a full-course credit, etc.

The Department

Chairman of the Department: D.W. Smith
Departmental Supervisor of Graduate Studies:
Eveline Voldeng

The program of studies leading to a Master of Arts in French is divided into three sectors: literary history, literary criticism, and the linguistic analysis of literary discourse. The program should be treated as an open system allowing for an exchange among these three closely interrelated fields of study and methodological approaches.

Qualifying Year Program

Applicants who hold a general (pass) Bachelor's degree with second-class standing or higher, with a major in French, will be required to register in the Qualifying Year program (normally five courses in French chosen from those numbered at the 400 level), and maintain at least B- standing in each of these courses, before proceeding to the M.A. program.

Master of Arts

Admission Requirements

The normal requirement for admission into the Master's program is an Honours B.A. in French with high second-class standing.

Program Requirements

The following two patterns are available to candidates:

- Four full courses (or the equivalent) of which at least three must be chosen from those numbered at the 500 level; and a directed special studies option (20.590) with an oral examination
- Three full courses (or the equivalent) of which at least two must be at the 500 level; and a Master's thesis equivalent to two courses. An oral examination on the thesis and related fields will also be undertaken.

Candidates who choose to write a thesis may not take the directed special studies option (20.590).

The student will choose either literary history or literary criticism as the central area of study and will earn at least three credits in this area. The remaining two courses may be taken either from the other major sector (literary history or literary criticism), or one may be chosen from each of the two sectors outside the student's central area.

Students specializing in French literature will choose at least one course in the French-Canadian field, and those specializing in the French-Canadian field will choose at least one course in French literature.

With the approval of the department, Master's students in French may select a comparative literature course in partial fulfilment of their program requirements.

Academic Standing

A grade of at least B- must be obtained in each course counted for credit towards the Master's degree.

Selection of Courses

The following senior undergraduate courses are open to students in the Qualifying Year program, and, with the approval of the department, to students in the M.A. program:

French

- 20.431 Traduction littéraire
- 20.433 Sémantique et lexicologie du français
- 20.463 Aspects de la littérature (A): le portrait de l'artiste dans le roman québécois
- 20.466 Littérature et sciences humaines II: la problématique du contenu et de l'organisation esthétiques dans les œuvres littéraires

Graduate Courses*

The graduate courses offered by the department are open to students in the M.A. program and, with permission of the department, to students in the Qualifying Year program. For prerequisites, please consult the department.

- French 20.511T2

Auteurs, œuvres, thèmes: Octave Crémazie et Louis Fréchette

Étude de la première éclosion d'une littérature de langue française au Canada à travers les œuvres de deux écrivains du XIX^e siècle. Analyse de la poésie et de l'œuvre en prose de deux « poètes nationaux » québécois. Discussion de la conception que chacun des deux écrivains se faisait de son art. Odette Condemine.

- French 20.521T2

Courants, mouvements, écoles: Naissance et évolution de la critique littéraire au Canada français (1840-1970)

Étude du développement progressif d'une critique littéraire canadienne-française depuis ses origines dans le renouveau intellectuel des années 1840, jusqu'à la fin de la Révolution tranquille (1970).

Les principaux praticiens, les divers mouvements; problèmes d'ordre esthétique et idéologique. Études de textes théoriques et critiques, confrontations d'œuvres littéraires avec les appréciations critiques qui en ont été données.

Michel Gaulin.

- French 20.531T2

Genres: Flaubert romancier: Analyses discursives et narratologiques

Analyse des romans de Flaubert depuis la première jusqu'à la deuxième version de *L'Éducation sentimentale* (1845-1869). Recherche des figures qui forment la rhétorique du discours et du récit réalistes. Examen de la théorie romanesque de Flaubert

et du rapport entre théorie et pratique dans ses romans.

Albert Halsall.

- French 20.551T2

Critique sociologique et idéologique

Spiritualisme et matérialisme dans l'écriture moderne. Étude des deux courants idéologiques qui façonnent l'écriture moderne. Dégagement des deux tendances et de leurs interférences à travers des textes naturalistes, surréalistes, existentialistes, etc. Références théoriques: J. Dubois, Cl. Duchet, Escarpit, etc.

Stéphane Sarkany.

- French 20.590T2, S2

Études dirigées

Tout étudiant qui ne fait pas de thèse, choisira un directeur d'études avec qui il/elle préparera un mémoire d'une cinquantaine de pages sur un sujet de son choix. Ce travail sera sanctionné par un examen oral.

- French 20.599F4, W4, S4

M.A. Thesis

Courses Not Offered in 1981-82

20.501 Linguistique théorique

20.561 Mythocritique, psychocritique

20.571 Séminaire

*F, W, S indicates term of offering.

Courses offered in the fall *and* winter (or any other two terms) will be followed by T.

The number following the letter indicates the credit weight of the course: 1 denotes a half-course credit, 2 denotes a full-course credit, etc.

The Department

Chairman of the Department: Jutta Goheen
Departmental Supervisor of Graduate Studies:
 J.B. Dallett

The Department of German offers programs of study leading to the degree of Master of Arts. These include courses on all major periods in German literature, genres, themes, and a number of individual authors, as well as on aspects of literary theory and the study of the German language. The Age of Goethe figures prominently in the teaching and research of the department, which offers a favourable setting for specialized studies in this period.

Departmental requirements conform to those outlined for Master's students in the general section of this calendar. Further information concerning graduate work in German can be obtained from the department.

Program Requirements

Master's students in German normally will be required to select and follow one of the following optional program patterns:

- Three full courses (or the equivalent) and a thesis
- Four full courses (or the equivalent) and a research essay
- Five full courses, or the equivalent.

While these courses will normally be courses offered by the department, permission, where appropriate, may be granted for enrolment in one course from the program of the Comparative Literature Committee.

German 22.590 is an obligatory course for all graduate students (full course credit).

All Master's students are also required to undertake a comprehensive examination, based on a departmental reading list.

Selection of Courses

The following senior undergraduate courses are open to students in the Qualifying Year program:

German

- 22.401 Formal German Speech
- 22.431 Medieval German Epic
- 22.441 German Baroque Fiction
- 22.451 Goethe
- 22.471 Early Twentieth-Century German Literature
- 22.472 Romantic Prose
- 22.473 Twentieth-Century Short Story

For 400-level courses not offered in 1981-82 see the undergraduate calendar.

Graduate Courses*

- German 22.548W1
 Deutsche Erzählprosa zwischen Reformation und Aufklärung.
 J.B. Dallett.
- German 22.549F1
 Genres in German Literature
 Satire, fantasy, and the poetics of scale. Kafka, Musil, (Robert Walser, Kunert).
 Basil Mogridge.
- German 22.567W1
 Period Studies
 Romantic poetry. Novalis, Tieck, Eichendorff, Brentano and others.
 Robert Gould.
- German 22.568T2
 Period Studies
 The convergence of lyrical and dramatic elements in works by Hauptmann, Hofmannsthal, Rilke, George, and selected Expressionists.
 E.M. Oppenheimer.
- German 22.574F1
 Individual Authors
 Goethe's Early Dramas. *Urfaust*, *Götz von Berlichingen*, *Egmont* and *Tasso*.
 Robert Gould.

*F,W,S indicates term of offering.
 Courses offered in the fall *and* winter (or any other two terms) will be followed by T.

The number following the letter indicates the credit weight of the course: 1 denotes a half-course credit, 2 denotes a full-course credit, etc.

- German 22.590T2

Directed Studies

An obligatory course of supervised study in preparation for the comprehensive examination.

- German 22.591F1, W1

Special Topic

Tutorial.

- German 22.598F2, W2, S2

Research Essay

- German 22.599F4, W4, S4

M.A. Thesis

Courses Not Offered in 1981-82

22.541 Genres in German Literature:

Struktur des modernen Romans

22.544 Genres in German Literature:

The German Idyll from Gessner to Mörike

22.545 Genres in German Literature:

Elemente des Prosastils im 20. Jahrhundert:

R.M. Rilke, A. Döblin, G. Grass, R. Kunze

22.546 Genres in German Literature:

Formen mittelalterlicher Lyrik und Probleme der literarischen Übersetzung

22.547 Genres in German Literature:

Radical poetics

22.550 Prevalent Themes in German Literature:

Myth in Drama

22.551 Prevalent Themes in German Literature:

Citizen, Bourgeois, Philistine

22.560 Period Studies: Dichter und Tradition

in mittelalterlicher Lyrik

22.565 Period Studies: Rhetorik in mittelalterlicher

Dichtung und Rede

22.566 Period Studies: Prosadenkmäler des 15.-

16. Jahrhunderts

22.572 Individual Authors: Heinrich von Kleist

22.573 Individual Authors: R.M. Rilke

22.575 Individual Authors: Keller

22.576 Individual Authors: Grimmelshausens

Simplicissimus.

22.581 Linguistic Problems

The Department

Chairman of the Department: J.W. Strong
Departmental Supervisor of Graduate Studies:
R.C. Elwood

The Department of History offers programs of study leading to the degree of Master of Arts in Canadian, American, British, modern French, modern Russian, international (diplomatic), and medieval history. It also offers a program of study and research leading to the degree of Doctor of Philosophy in Canadian history.

Master of Arts

Admission Requirements

The minimum requirement for admission to the Master's program is an Honours bachelor's degree (or the equivalent) with at least high second-class standing.

The department offers no Qualifying Year program; applicants with a general (pass) degree may be considered for admission into the fourth year of Carleton's Honours B.A. program.

Program Requirements

Candidates may follow either a thesis or a non-thesis program, as follows:

- History 24.588 or 24.589:
a seminar or tutorial in the historiography of the appropriate country or area (one credit)
- History 24.500:
a practicum in the applied uses of history (one credit)
- a graduate history seminar in the student's major field of concentration (one credit)
- *Either* History 24.599:
thesis (two credits); *or*
- History 24.598:
research essay (one credit) *plus* one additional seminar (one credit), which may be chosen from those offered at the graduate or 400-level by the Department of History, by another department at Carleton, or by the Department of History at the University of Ottawa.

Language Requirements

All candidates are required to demonstrate a reading knowledge of a language other than English, the choice to depend upon the field of the candidate's thesis or research. For seminars dealing with sources not in English, a reading knowledge of the appropriate language will be required *before* registration. For details, contact the supervisor of graduate studies.

Doctor of Philosophy

Admission Requirements

Applicants with an M.A. degree will be expected to have at least high second-class standing.

An applicant with an Honours bachelor's degree who has achieved an outstanding academic record and, in addition, exhibits very strong motivation and high promise for advanced research, may be admitted to the Ph.D. program directly. Such candidates will be required to complete at least 15 full courses, or the equivalent.

Residence Requirements

- A minimum of three years of full-time study after the B.A. Honours degree or two years after the M.A.

Program Requirements

Candidates will be responsible for three fields, one of which will be related to the subject of thesis research, and one of which may be in a related discipline. The fields will normally be selected from Canadian history, American history, modern British history and an aspect of modern European history. Each field will cover approximately one century.

There will be written examinations in the two non-thesis fields and one oral comprehensive examination covering all three. These will be taken normally within four terms following the beginning of the first Ph.D. year.

A reading knowledge of French will be required. The language examination will be written early in the first post-M.A. year, and before the candidate is permitted to take the doctoral fields examination. Proven competence in an

additional language may be required if it is pertinent to the candidate's program.

Students entering the program with an Honours B.A. will normally take

- History 24.588: Historiography of Canada
- History 24.591: Directed Studies in a Canadian Field
- History 24.592: Directed Studies in a Non-Canadian Field
- and two other graduate seminars in their first year.

Students entering the second year (that is, the first post-M.A. year) will normally be required to follow:

- History 24.688: Social History
- History 24.690: preparation for a Ph.D. oral examination in Canadian history (equivalent to two full credits)

• Two of History 24.610: Directed Studies in an Aspect of Modern European History; History 24.640: Directed Studies in United States History; History 24.650: Directed Studies in British History; an approved course of studies in a related discipline appropriate to the candidate's field. Candidates may take an appropriate 500-level seminar.

With other requirements completed, candidates will be required to write a thesis on a topic related to Canadian history (five credits).

University of Ottawa

A Carleton student may take one seminar in the Department of History at the University of Ottawa, with permission of the two departments. The following graduate seminars are available in various years:

- 5300 Directed Studies in Canadian History
- 5400 Directed Studies in Canadian History
- 5402 New France: Problems in the Interpretation of Colonial History
- 5405 The History of the Left in Canada, 1867-1960
- 5406 The Union of the Canadas, 1839-1867
- 5414 Lower Canada 1760-1840
- 5700 Études dirigées en Histoire du Canada
- 5702 Textes relatifs à l'Histoire sociale de la Nouvelle-France
- 5705 Rapports intellectuels du Canada français avec l'extérieur au XIX^e siècle

- 5800 Études dirigées en Histoire du Canada
- 5802 Problèmes en Histoire sociale de la Nouvelle-France
- 5807 Études dirigées en Histoire du Québec
- 5814 Le Bas-Canada, 1760-1840
- 6302 Seminar on United States Foreign Relations in the Nineteenth and Twentieth Centuries
- 6303 Seminar in American History
- 6403 Seminar in American History
- 7300 Directed Studies in European History
- 7390 Problems in European Diplomatic History, 1815-1914
- 7400 Directed Studies in European History
- 7412 Seminar in Economic History of Colonial America
- 7691 La transition de l'ère pré-industrielle à l'ère industrielle, en Europe, aux XVIII^e, XIX^e siècles. Économies et sociétés
- 7700 Études dirigées en Histoire européenne
- 7704 Séminaire en Histoire sociale
- 7800 Études dirigées en Histoire européenne
- 7891 Histoire des organisations internationales en fonction des idéologies du monde contemporain

Graduate Courses*

Most, but not all of the graduate seminars (History 24.500 through 24.588 and 24.688) are offered each year, but none is available during the summer. The directed studies and thesis courses (History 24.589 through 24.690) are always offered during the academic year, and are frequently available during the spring and summer terms as well.

- History 24.500T2
Practicum in Applied History
Study of the practical uses of history in such fields as archival management, museum research, oral history, journal editing, quantitative investigations, and contract research.
D.A. Muise and members of the department.

*F,W,S indicates term of offering.
Courses offered in the fall *and* winter (or any other two terms) will be followed by T.

The number following the letter indicates the credit weight of the course: 1 denotes a half-course credit, 2 denotes a full-course credit, etc.

- History 24.505T2

Law and Society in Medieval England
J.G. Bellamy.

- History 24.516T2

The French Revolution, 1788-1804
A sound reading knowledge of French is required for admission.
M.J. Sydenham.

- History 24.532T2

Studies in the Economic and Social History of Upper Canada and Ontario, 1815-1880
J.K. Johnson.

- History 24.534T2

Problems of Growth and War in Canada, 1896-1921
M.J. Barber and R.T. Clippingdale.

- History 24.535T2

Canada in the North Atlantic World, 1900-1939
An examination of Canada's changing relationships with Great Britain and the United States.
D.M.L. Farr.

- History 24.536T2

Canada Between the Wars, 1919-1939
H.B. Neatby.

- History 24.537T2

The Maritimes in Transition, 1840's to 1890's
A seminar on social and economic themes. Quantitative approaches and comparative themes with Central and Western Canada will be encouraged.
D.A. Muise.

- History 24.538T2

The Indian Peoples of Eastern British North America, 1763-1867
S.F. Wise.

- History 24.539T2

Acadian Society, 1604-1967
N.E.S. Griffiths.

- History 24.540T2

The Growth of American Consciousness (From the Great Awakening to the Mexican War)
P.J. King.

- History 24.557T2

Community in Early Modern England, 1450-1600
R.B. Goheen.

- History 24.558T2

Reform and Society in Mid-Nineteenth-Century Britain
J.N. Cooper.

- History 24.560T2

Revolutionary Russia, 1898-1921
An examination of various primary sources available for research on revolutionary Russia. A sound reading knowledge of Russian is required for admission.
R.C. Elwood.

- History 24.570T2

British Imperial History
Research will normally be done on a British North American or Canadian subject, considered in an imperial context between the late eighteenth and early twentieth centuries.
G.P. Browne.

- History 24.580T2

Problems in International History: Polarization and Cold War, 1917-1950
J.L. Black.

- History 24.588T2

Historiography of Canada
A seminar, primarily for graduate students in Canadian history, which examines the trends and methods of Canadian historical writing, and the influences upon it.
S.R. Mealing.

- History 24.589T2, S2

Historiography
A course of directed studies in one of the following fields:

Modern France

The intensive study of selected problems in the writing of modern French political and social history.

M.J. Sydenham and E.P. Fitzgerald.

Britain

The intensive study of a range of selected problems in the writing of sixteenth-century or nineteenth-century English history.

R.B. Goheen or J.N. Cooper.

Modern Russia

Concentrated reading in Russian intellectual history and supervised study of Russian historiography, with emphasis on the nineteenth and early twentieth centuries.

R.C. Elwood and J.W. Strong.

United States

A course in which the trends and methods of historical writing on the United States will be examined.

P.J. King.

International History

A course in which the trends and methods of historical writing on international history will be examined.

J.L. Black and R.A. Jones.

Medieval History

Historical method and historiography of an aspect of the Middle Ages.

J.G. Bellamy.

- History 24.591T2, S2

Directed Studies in a Canadian Field

A program of supervised reading and preparation of written work in an area not covered by an existing graduate seminar.

- History 24.592T2, S2

Directed Studies in a Non-Canadian Field
(same description as 24.591)

- History 24.593F1, W1, S1

Directed Studies in a Canadian Field
(same description as 24.591)

- History 24.594F1, W1, S1

Directed Studies in a Non-Canadian Field
(same description as 24.591)

- History 24.598F2, W2, S2

M.A. Research Essay

An examination of an approved topic in Canadian, American, British, modern French, modern Russian, international, or medieval history.

- History 24.599F4, W4, S4

M.A. Thesis

A substantial historical investigation. The subject will be determined in consultation with the department, and a supervisor will be assigned. The candidate will be examined orally after presenting his/her thesis.

- History 24.610T2, S2

Directed studies in one of the following aspects of modern European history: modern France (M.J. Sydenham and E.P. Fitzgerald), modern Russia (R.C. Elwood and J.W. Strong), and international history (J.L. Black and R.A. Jones).

- History 24.640T2, S2

Directed Studies in United States History
P.J. King and E.R. Kantowicz.

- History 24.650T2, S2

Directed Studies in British History
J.N. Cooper.

- History 24.688T2

Social History

A course, primarily for doctoral candidates in history, in which the literature and methodology of basic aspects of social history will be examined. R.B. Goheen and members of the department.

- History 24.690T4, S4

Directed Studies in Canadian History

A program of supervised reading with several instructors in preparation for the Ph.D. oral examination.

- History 24.699F, W, S

Ph.D. Thesis

The School

Director of the School: G.S. Adam

Supervisor of Graduate Studies: R.J. Rupert

The School of Journalism offers courses leading to the degree of Master of Journalism. The emphasis in the M.J. program is on advanced professional education for those who are or intend to become practising journalists in the news media, but there is provision for students who wish to undertake research in journalism and mass media.

Students who wish to complete a non-professional degree in either media and society and/or journalism research are advised to consult with the Institute of Canadian Studies; it is possible to work out an M.A. program in these areas under the joint supervision of the institute and the School of Journalism.

Students entering the Master's program will choose one of four areas of concentrated study:

Specialized Reporting

Courses provide advanced training in specialized news beats in journalism, such as politics, the economy, or international affairs.

Specialized Media

The focus of this specialty will be techniques of television, radio and documentary film. Students will be expected to work to standards of professional competence.

Media and Society

This specialty encompasses a number of topics, among which are the law of the press, journalism history, government-press relations, issues in contemporary journalism, such as those raised by the ownership and control of publishing and broadcasting in Canada, and an examination of the role of the media in society as it is conceived by selected social and political theorists.

Journalism Research

This will focus on the theories and methods, mainly quantitative, of research into the communication processes, with emphasis upon journalism and news media systems.

Carleton's School of Journalism is uniquely situated for advanced journalism study. It offers

ready access to many of the people and institutions that most directly influence Canadian affairs: Parliament, federal government departments and agencies, embassies, business and labour organizations and major economic and cultural institutions are close at hand.

Qualifying Year Program

Applicants who have three-year (pass) journalism degrees with high second-class standing may be admitted to a Qualifying Year program, made up largely of courses from the Faculty of Arts. An applicant with a background in another discipline, who does not have a journalism degree or the equivalent, may be admitted to a Qualifying Year of basic professional studies if he or she achieved at least a B average in the previous degree.

Students who complete a Qualifying Year program with high second-class standing may proceed with Master's level studies the following year.

For details of the regulations governing Qualifying Year programs, refer to the general section of this calendar.

Master of Journalism

Admission Requirements

Admission to the M.J. program is selective. The basic requirement is an Honours B.J. degree with at least high second-class standing or its equivalent. Long and distinguished professional experience may also serve as a basis for admission. Applicants who combine an undergraduate degree (not in journalism) and professional experience will also be considered for admission.

The school will consider the applicant's undergraduate background and/or professional experience in assigning a program of studies.

As a condition for graduation, all students are required to have a minimum of four months of practical experience in the media, and a working knowledge of a second language, preferably French.

Graduate Courses*

Students are required to complete successfully five full courses or the equivalent. They will have their work evaluated at the end of each academic term and those working below a B- level normally will be asked to withdraw.

In 1981-82 most courses will be prescribed and students will be required to complete:

- Journalism 28.530F1

Mass Media/Mass Society

Theories used in the analysis of the relationship between mass media and mass societies will be examined.

J.R. Weston.

- Journalism 28.532W1

Press and Government

A critical examination of the press in the political systems of Britain, the United States and Canada. The course will include a research component.

G.S. Adam.

- Journalism 28.540T2

Specialized Reporting

A series of seminar-workshops on approaches and problems in one area of reporting, such as politics, international affairs, labour, science or finance. (Certain of these specialties may not be offered every year.)

Murray Goldblatt, David Van Praagh and Anthony Westell.

- Journalism 28.599F4, W4, S4

M.J. Thesis

The student will complete a substantial piece of public affairs journalism in any medium, *or* a research project on the mass media, *or* make a major contribution to journalism education through the production of a document on an aspect of journalism practice.

The courses described above constitute four of the required five credits. Students will choose from among the following options to complete their course requirements:

- Journalism 28.521F1

Journalism Research

A laboratory course in design and analysis of mass media research. Under direction, students will undertake all phases of a research project from conceptualization of the problem through reporting findings.

J.R. Weston.

- Journalism 28.522W1

Journalism Research

A seminar course dealing in depth with selected methodological and theoretical issues in media research.

J.R. Weston.

- Journalism 28.551W1

Communications Law

This intensive course is concerned with the general laws governing the mass media in Canada, with attention to their effect on freedom of expression. Specific topics for examination include contempt of court; free press; fair trial; revealing of sources; civil defamation; criminal libel; obscenity and censorship; copyright; privacy; government secrecy; the law of advertising. (This course may not be taken by students who have completed 28.351, or 51.351, or 28.445.)

- Journalism 28.588F1

Directed Readings

Students, working under faculty direction, will undertake an intensive reading schedule in order to pursue a subject area of particular interest.

- Journalism 28.589W1

Directed Research

Students, working under faculty direction, will develop and undertake a research project in order to pursue a subject area of particular interest.

- Journalism 28.590T2, S2

Directed Studies

Reading and research tutorials.

- Journalism 28.591F1, W1, S1

Directed Studies

Reading and research tutorials.

*F,W,S indicates term of offering.

Courses offered in the fall *and* winter (or any other two terms) will be followed by T.

The number following the letter indicates the credit weight of the course: 1 denotes a half-course credit, 2 denotes a full-course credit, etc.

With the approval of the school and the participating department, M.J. students may take two half-courses in either political science or economics.

Department of Linguistics

The Department

Chairman of the Department: Ian Pringle

The Department of Linguistics does not offer a program of studies at the graduate level, but does offer opportunity for independent study to students in the Institute of Canadian Studies in the areas of linguistic study of the Cree, Iroquois and Inuit languages, Canadian English and Canadian French dialectology, and the teaching of English as a second language. Members of the department are also prepared to supervise graduate theses on linguistic subjects.

In co-operation with the Faculty of Graduate Studies and Research, the department publishes the papers of the annual Algonquian Conference.

Graduate Courses*

- Linguistics 29.590F1, W1, S1

Native Languages of Canada

A tutorial to study the descriptive, historical and anthropological aspects of selected native languages of Canada, among them Cree, Iroquois and Inuit.

Prerequisite: Honours courses in linguistics or permission of the department.

- Linguistics 29.591F1, W1, S1

Sociolinguistic Aspects of Bilingualism

A tutorial to study the linguistic aspects of French-English bilingualism, including sociolinguistic and psycholinguistic factors.

Prerequisite: Honours courses in linguistics or permission of the department.

*F, W, S indicates term of offering.

Courses offered in the fall *and* winter (or any other two terms) will be followed by T.

The number following the letter indicates the credit weight of the course: 1 denotes a half-course credit, 2 denotes a full-course credit, etc.

The Department

Chairman of the Department: David Piper

The Department of Music offers a course at the graduate level in the history of Canadian music and related fields, in co-operation with the Institute of Canadian Studies. Full use will be made of the resources of the National Library, the Public Archives and the National Museum of Man.

Dr. Elaine Keillor is lecturer in Canadian music with Dr. Helmut Kallmann (Chief Music Librarian, National Library) as Adjunct Professor.

Graduate Courses*

- Music 30.510T2

History of Canadian Music I

Selected aspects of Canadian music from 1600 to the present; liturgical music; social and economic conditions of Canadian musical life; regional studies; individual composers.

Prerequisite: Permission of the department and the Institute of Canadian Studies.

- Music 30.511F1

History of Canadian Music II

Selected problems of folk music in Canada.

Prerequisite: Permission of the department and the Institute of Canadian Studies.

- Music 30.512W1

History of Canadian Music III

Selected problems in the music of Canadian ethnic minorities, especially Inuit and Indian traditions.

Prerequisite: Permission of the department and the Institute of Canadian Studies.

*F,W,S indicates term of offering.

Courses offered in the fall *and* winter (or any other two terms) will be followed by T.

The number following the letter indicates the credit weight of the course: 1 denotes a half-course credit, 2 denotes a full-course credit, etc.

Department of Philosophy

The Department

Chairman of the Department: Bernard Wand
Departmental Supervisor of Graduate Studies:
Andrew Jeffrey

The Department of Philosophy offers programs of study leading to the degree of Master of Arts.

Qualifying Year

Applicants who do not hold an Honours degree (or the equivalent) will be required to register in a Qualifying Year program before proceeding to the Master's program.

The regulations governing the Qualifying Year are outlined in the general section of this calendar.

Master of Arts

Admission Requirements

The minimum requirement for admission to the Master's program is an Honours B.A. degree (or the equivalent) in Philosophy with at least high second-class standing.

Applicants for admission from an institution other than Carleton University must submit two papers.

Program Requirements

The specific program requirements for Master's candidates are the following:

- Philosophy 32.545, the departmental seminar
- A thesis equivalent to two full course credits, which must be defended at an oral examination; *or* a research essay equivalent to one full course credit
- Four half-course credits (or *six* in the case of students following the research essay option) in at least three of the following study areas: studies in the history of philosophy; studies in the work of an individual philosopher; studies in logic, epistemology, or metaphysics; studies in selected problems in philosophy.

In exceptional cases, a maximum of one full course (or the equivalent) may be selected from those offered at the 400 level, or in a related field, or at another university.

Academic Standing

A grade of B- or better must be obtained in each course and on the thesis or the research essay.

Selection of Courses

The department normally offers each year six 400-level undergraduate half-courses, which are open to students in the Qualifying Year and, with permission, to students in the M.A. program. For courses offered in 1981-82 see the undergraduate calendar.

Graduate Courses*

The following graduate courses are open to students in the M.A. program and, with permission, to students in the Qualifying Year program. Five two-hour tutorial sessions will be required in each half-course.

- Philosophy 32.504F1
Tutorial in the History of Philosophy I
Detailed study of a period or issue in the history of philosophy.
- Philosophy 32.505W1
Tutorial in the History of Philosophy II
Detailed study of a period or issue in the history of philosophy.

*F,W,S indicates term of offering.
Courses offered in the fall *and* winter (or any other two terms) will be followed by T.

The number following the letter indicates the credit weight of the course: 1 denotes a half-course credit, 2 denotes a full-course credit, etc.

- Philosophy 32.510F1

Advanced Problems in Legal Philosophy
Studies in legal theories and analyses of law advanced by Hart, Dworkin and others, and legal concepts: for example, principles, rights, duties, liability, etc. Precise course content will vary from year to year and will be announced at the beginning of the term.

Prerequisite: Philosophy 32.350 (Law 51.310) or permission of the relevant department.

Patrick Fitzgerald and Randal Marlin.

- Philosophy 32.514F1

Tutorial in the Work of an Individual
Philosopher I

A critical and systematic study of the work of an individual philosopher.

- Philosophy 32.515W1

Tutorial in the Work of an Individual
Philosopher II

A critical and systematic study of the work of an individual philosopher.

- Philosophy 32.524F1

Tutorial in Logic, Epistemology or Metaphysics I
An attempt to find a solution to a specific problem in logic, epistemology or metaphysics.

- Philosophy 32.525W1

Tutorial in Logic, Epistemology or Metaphysics II
An attempt to find a solution to a specific problem in logic, epistemology or metaphysics.

- Philosophy 32.534F1

Tutorial in Selected Problems of Philosophy I
An attempt to find a solution to a specific problem in some area other than logic, epistemology or metaphysics.

- Philosophy 32.535W1

Tutorial in Selected Problems of Philosophy II
An attempt to find a solution to a specific problem in some area other than logic, epistemology or metaphysics.

- Philosophy 32.545T2

Departmental Seminar
Research papers to be given by faculty members and students.

- Philosophy 32.576W1

Ethical and Cultural Dimensions in Development
Studies

Exploration of concepts of value, rights, duties, law and obligation in relation to global development issues. Comparative analysis of major ideological and ethical foundations of regional cultures and the problems for cross-cultural and transnational relations.

(Also offered as International Affairs 46.576)

J.T. O'Manique.

- Philosophy 32.598F2, W2, S2

Research Essay

- Philosophy 32.599F4, W4, S4

M.A. Thesis

Department of Religion

The Department

Chairman of the Department: R.M. Polzin
Departmental Supervisor of Graduate Studies:
J.P. Dourley

The Department of Religion offers programs of study leading to the degree of Master of Arts.

Master of Arts

Admission Requirements

The minimum requirement for admission to the Master's program is an Honours bachelor's degree in religion (or the equivalent) with at least high second-class standing.

Applicants who do not hold an Honours degree in religion (or the equivalent) will be required to register in a Qualifying Year program before proceeding to the Master's program.

The regulations governing the Qualifying Year are outlined in the general section of this calendar.

Program Requirements

The student will choose a program of study concentrating on one of the following major areas: comparative religion, with special emphasis on one of the major traditions; biblical and ancient near eastern studies; and modern religious thought and culture. Candidates must follow either a thesis or non-thesis program. The specific requirements are as follows:

Thesis Program

- Seminars equivalent to one full course in major area
- Seminars equivalent to one full course, selected from one or both of the other areas
- Tutorial in major area for one-course credit
- Thesis (equivalent to two full courses) on a topic in major area, which must be defended at an oral examination.

Non-Thesis Program

- Seminars equivalent to three full courses; of these, at least two half-course seminars must be from the major area, at least two from a second area, and at least one from the remaining area.

- Comprehensive reading course in major area
- One additional course in major area.

The student's program will be worked out in consultation with, and with the approval of, the department's supervisor of graduate studies and its committee on graduate studies. The prescribed program will take into account the student's background and special interests as well as the research interests and competence of the staff.

Language Requirements

The student will be required to acquire, or to demonstrate that he/she already has, a reading knowledge of whatever language is essential to his/her research.

Students are advised to consult the departmental handbook for further regulations.

Graduate Courses*

- Religion 34.510F1

Seminar in Comparative Religion: Sri Aurobindo's Exploration of Consciousness

A study of Sri Aurobindo's views on the subconscious, conscious, and superconscious levels of consciousness, with reference to traditional Indian theories, modern influences, and practical aspects of his integral yoga.

Nalini Devdas.

- Religion 34.511W1

Seminar in Comparative Religion: The World of Islam in the Eyes of Al-Ghazali (d.1111)

A study of one of the central scholars of Islam, dealing with his translated works. His numerous perspectives on Islam (legal, theological, philosophical and mystical) will be analyzed.

L.T. Librande.

- Religion 34.512T2, S2

Tutorial in Comparative Religion

*F,W,S indicates term of offering.

Courses offered in the fall *and* winter (or any other two terms) will be followed by T.

The number following the letter indicates the credit weight of the course: 1 denotes a half-course credit, 2 denotes a full-course credit, etc.

- Religion 34.513F1, W1, S1

Directed Studies in Comparative Religion
Seminar for additional study in this area.

- Religion 34.520F1

Seminar in Biblical and Ancient Near Eastern
Studies: Literary-Structural Studies of the Deutero-
nomic History

This seminar assumes the unity of Deuteronomy
— 2 Kings, and will attempt to describe key fea-
tures of its framework. This will involve a syn-
chronic study, unencumbered by prior diachronic
assumptions, and directed toward a compositional
analysis. Russian literary critics, such as M. Bakhtin
and B. Uspensky will provide a theoretical basis
for this approach.

R.M. Polzin.

- Religion 34.521W1

Seminar in Biblical and Ancient Near Eastern
Studies: The Lukan Writings

An examination of the theological and historical
problems raised by the Gospel of Luke and the
Acts of the Apostles.

S.G. Wilson.

- Religion 34.522T2, S2

Tutorial in Biblical and Ancient Near Eastern
Studies

- Religion 34.523F1, W1, S1

Directed Studies in Biblical and Ancient Near
Eastern Studies

Seminar for additional study in this area.

- Religion 34.530F1

Seminar in Modern Religious Thought and Culture:
Religion and Psyche in the Psychology of
C.G. Jung

An examination of Jung's psychology under
his rubric of the psyche as matrix of religious
experience, and the religious implications of his
psychology in itself, and in its relations of com-
plementarity or contradiction with other psychol-
ogies and theological anthropologies.

J.P. Dourley.

- Religion 34.531W1

Seminar in Modern Religious Thought and Culture:
The Interconnection of Religion and Ethics

An inquiry into the connection between assumptions
about the sacred, persons, history, and nature
implied or explicated in the doctrines and symbols

of religious traditions, and the morality of those
traditions.

A.R. Gualtieri.

- Religion 34.532T2, S2

Tutorial in Modern Religious Thought and
Culture

- Religion 34.533F1, W1, S1

Directed Studies in Modern Religious Thought and
Culture

Seminar for additional study in this area.

- Religion 34.590T2, S2

M.A. Comprehensive Reading

Not open to students pursuing a thesis program.

- Religion 34.599F4, W4, S4

M.A. Thesis

Department of Spanish

The Department

Chairman of the Department: Ross Larson
Departmental Supervisor of Graduate Studies:
C.A. Marsden

The Department of Spanish offers a Master's program, with specialization in either Peninsular or Spanish-American literature, or a combination of both.

All requests for more information concerning the program should be addressed to the departmental supervisor of graduate studies. The department will supply reading lists for individual courses and for the general comprehensive examination, and a brochure containing details of particular requirements and other information related to Spanish studies at Carleton.

Master of Arts

Admission Requirements

The requirements for admission to the Master's program are outlined in the general section of this calendar.

Program Requirements

The minimum program requirements for Master's candidates are stated in the general section.

The Master's program may be undertaken in one of the following optional patterns:

- Three full courses (or the equivalent, not including 38.595), and a thesis equivalent to two full courses
- Five full courses (or the equivalent, not including 38.595).

The Department of Spanish encourages candidates to select the thesis pattern.

The department also requires all students to undertake general comprehensive examinations, and to complete a non-credit seminar on bibliography and research methods.

Students wishing to study aspects of Hispanic literature not specifically offered by the department may enrol in Spanish 38.590: Directed Studies, if a specialist in the desired field is available.

All courses taken by graduate students shall be chosen in consultation with the department. From time to time certain courses offered by other departments may be accepted as part of the Master's program in Spanish, and special arrangements can occasionally be made to undertake part of the program at universities in Spanish-speaking countries.

Selection of Courses

The following senior undergraduate courses are open to students in the Qualifying Year program, and with permission, to students in the M.A. program.

Spanish

- 38.415 Medieval Spanish Literature from the Origins through 1300
- 38.416 Medieval Spanish Literature, 1300-1500
- 38.420 Cervantes
- 38.430 Modern Spanish Novel
- 38.431 Contemporary Spanish Novel
- 38.435 Modern Spanish Drama
- 38.436 Contemporary Spanish Drama
- 38.440 Modern Spanish Poetry
- 38.441 Contemporary Spanish Poetry
- 38.460 Twentieth-Century Spanish-American Novel I
- 38.461 Twentieth-Century Spanish-American Novel II
- 38.470 Twentieth-Century Spanish-American Poetry I
- 38.471 Twentieth-Century Spanish-American Poetry II
- 38.490 Seminar on a Special Topic
- 38.491 Seminar on a Special Topic
- 38.492 Special Studies

Graduate Courses*

- Spanish 38.515W1
Aspects of Medieval Literature: *El Libro de Buen Amor*
A critical analysis of this medieval Spanish work, dealing with its philological, literary, institutional, and historical aspects.
Francisco Hernández.
- Spanish 38.520W1
Special Topic on Golden Age Literature: The Picaresque Novel
An examination of the Spanish Picaresque novel, with reference to the Picaresque in other literatures, in the light of recent interpretations.
C.A. Marsden.
- Spanish 38.525W1
Studies in Eighteenth-Century Literature: The Baroque Prose of Torres Villarroel
A critical study of representative satiric works of Torres Villarroel. Particular attention will be paid to the lexicon, grammar, and the artistic technique of the author.
José Jurado.
- Spanish 38.530F1
Problems of Modern Spanish Literature: Post-Romantic Poetry
A study of the poetics and poetry of the most representative authors from Bécquer to A. Machado.
Francisco Atienza.
- Spanish 38.550F1
Aspects of Spanish-American Literature before 1888: Baroque Drama — Juan Ruiz de Alarcón and Sor Juana Inés de la Cruz
An examination of the forms and conventions of Baroque drama, and of the contribution to it of these two Mexican authors.
C.A. Marsden.

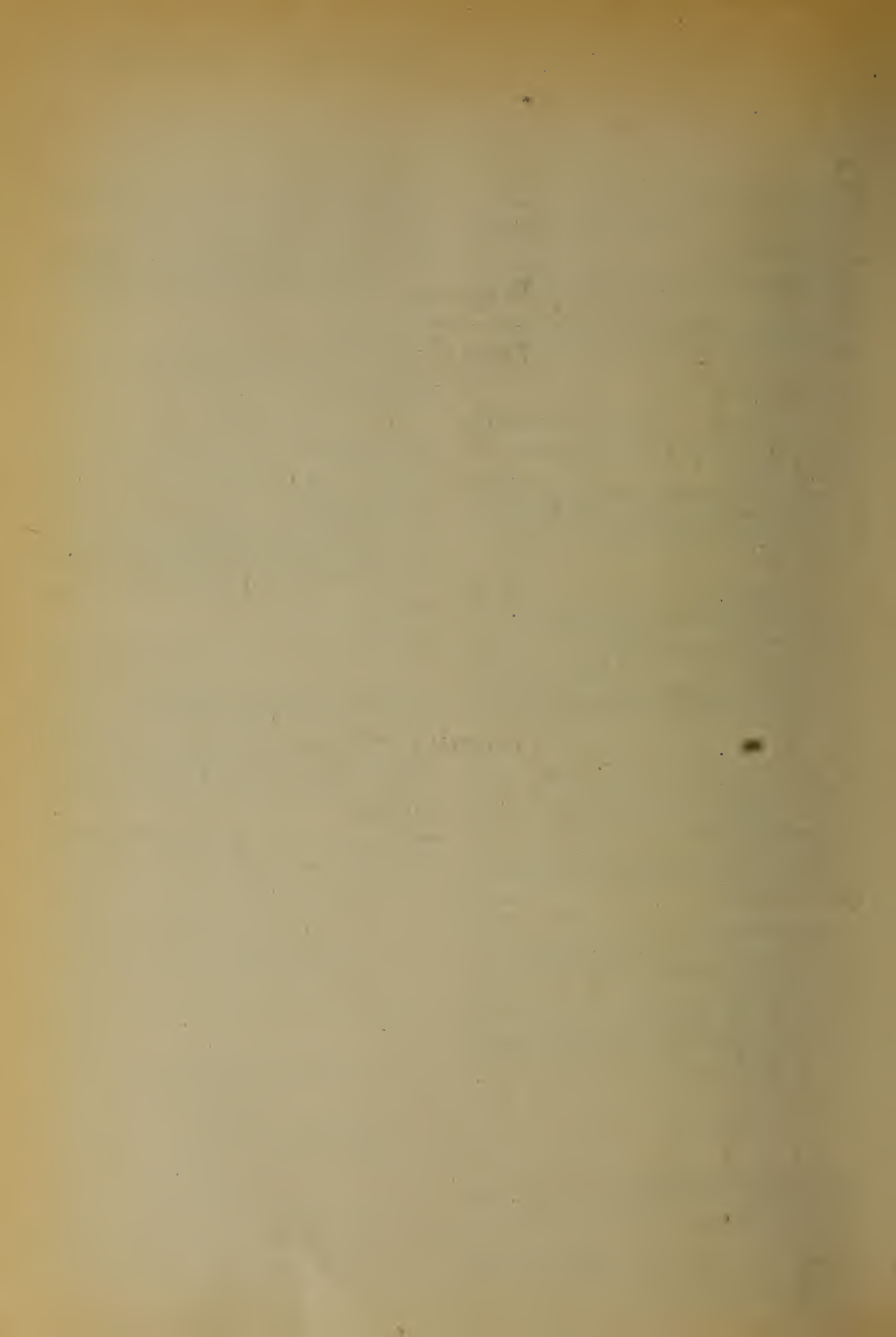
- Spanish 38.570T2
Special Problems in Spanish-American Literature: The Poetry and Prose of Nicolás Guillén
An analysis of the prose and the *poesía sintetizante* of Cuba's national poet, with special emphasis on literary aesthetics, literary americanism, and the ethnicity factor.
R.L. Jackson.
- Spanish 38.590T2, S2
Directed Studies
- Spanish 38.591F1, W1, S1
Directed Studies
- Spanish 38.595F1, W1, S1
Directed Readings
Additional half-courses, designed in particular for students requiring special assistance in preparing for comprehensive examinations.
- Spanish 38.599F, W, S
M.A. Thesis

Courses Not Offered in 1981-82

- 38.505 History of the Spanish Language
- 38.506 Historical Grammar of the Spanish Language
- 38.560 Aspects of Spanish-American Literature after 1888

*F,W,S indicates term of offering.
Courses offered in the fall and winter (or any other two terms) will be followed by T.

The number following the letter indicates the credit weight of the course: 1 denotes a half-course credit, 2 denotes a full-course credit, etc.



Departmental

Program

Descriptions

and

Details

of

Courses

Faculty of Engineering

Dean: M.C. de Malherbe



Programs of study are offered by the Faculty of Engineering leading to the degrees of Master of Engineering and Doctor of Philosophy in Aeronautical, Civil, Electrical and Mechanical Engineering, to the degree of Master of Engineering in Materials Engineering and, in co-operation with the Faculty of Science, to the degree of Master of Science in Information and Systems Science.

The areas of current research, the research facilities available and the graduate courses offered are given in the following pages for the four departments of the faculty:

- Civil Engineering
- Electronics
- Mechanical and Aeronautical Engineering
- Systems and Computer Engineering

Although each candidate will pursue his/her studies and research within one of these departments, he/she is encouraged to take at least one half-course outside his/her department. Both the Master's and Ph.D. programs may be undertaken on a full-time or part-time basis.

General information on awards and financial assistance is given in that section of this calendar.

A limited number of students who are not degree candidates may be admitted to each graduate engineering course. Credit earned as a special student normally cannot be counted towards the requirements of a graduate degree in engineering.

Computing Facilities

The University has a central system with comprehensive facilities including a large number of time-sharing terminals, remote job entry from the Mackenzie Building for batch, and a plotter and graphics. A large number of mini-computers including four with disc-operating systems and interactive graphics are in use by the various engineering departments.

Special Arrangements

Research in an Outside Institution

A student may apply for permission to carry out his/her research, in part or whole, in an outside

institution (for example, industrial, governmental, or university laboratory). Such an application, addressed to the dean of graduate studies and research through the dean of engineering, should:

- Include a detailed statement of the research proposal, of arrangements for supervision and of the circumstances under which it is to be carried out
- Establish that the applicant will be able to pursue independent research
- State the facilities available for the research
- Include a proposed time-schedule
- Be accompanied by a supporting letter from a responsible person in the outside institution giving approval of the proposal and accepting these regulations.

Part-time Thesis Research

A part-time research program may be permitted if the conditions for the "presence" of the student outlined under program requirements are satisfied. It is the responsibility of the research supervisor to define the fraction of full-time research engaged upon by the student so that this can appropriately be credited to his/her program and assessed for payment of tuition fees. Before permission to undertake research on a part-time basis can be granted, the student must submit in writing, to the dean of graduate studies and research through the dean of engineering, a statement of his/her proposed manner of working part-time, supported by a letter of approval from his/her employer.

Transfer of Credit

Normally credit for one full graduate course completed at another university may be accepted in partial fulfillment of degree requirements, provided that the course is appropriate to the candidate's program at Carleton. Under special circumstances a second full course may be allowed. Refer to the general section of this calendar for details of the rules governing transfer of credit.

Master of Engineering

Admission Requirements

Applicants are admitted under the general regulations specified in this calendar, but in addition are required to have strong undergraduate preparation in the appropriate engineering disciplines, computer programming, mathematics and physics.

Program Requirements

Two alternatives are available for full-time students studying towards the degree of Master of Engineering. One involves not less than six half-courses and a thesis. The other involves 12 half-courses and does not involve a thesis. In both cases, the candidate must take at least three graduate-level half-courses in engineering in each term. Usually no undergraduate engineering courses may be taken for credit. Equivalent alternate programs will be arranged for part-time students. Choice of the alternative to be taken must be arranged and approved at the time of admission into the program.

Each candidate submitting a thesis will be required to undertake an oral examination on the subject of his/her thesis and related fields.

Full-time graduate students and part-time thesis students are required to attend departmental seminars held regularly to discuss current research and related topics. Each student must, of course, maintain a close working relationship with his/her supervisor and attend the courses in which he/she is registered. The supervisor may require the student to submit written reports and to present seminars.

Thesis Regulations

The thesis must represent the result of the candidate's independent research or development work, undertaken after admission to graduate studies at Carleton University. Experimental or theoretical results previously published by the candidate may be used only as introductory or background material for the thesis. A candidate may be permitted to carry on thesis research work off campus, provided that the work is approved in advance and arrangements have been made for supervision of thesis research activities by a faculty member of Carleton University. A part-time student may use

the Faculty of Engineering laboratory facilities for on-campus thesis research and development activities.

Waiver of Thesis

A candidate for the Master's degree who has, before admission, completed independent research or development projects of an adequate level of accomplishment, may apply to the chairman of the department concerned for a waiver of the thesis requirement. Such application must be made at the time of initial registration and must be supported by copies of published reports describing the work. If the application is approved, the candidate must take 10 half-courses or the equivalent, six of which must be graduate-level courses in engineering, to fulfil the requirement for the award of a degree without a thesis. A candidate who has been granted a waiver of the thesis requirement will be required to take an oral examination on the subject of one of his/her published papers and topics related to his/her field of specialization.

Doctor of Philosophy

Admission Requirements

For admission to the Ph.D. program, an applicant must normally hold a Master's degree in engineering (or its equivalent) and, by his/her previous program of study and scholastic record, demonstrate a capacity for advanced study and research. Experience gained while working in an engineering or research environment will be taken into account when assessing an application. The applicant must specify his/her intended field of research.

Program Requirements

The specific program requirements for the Ph.D. degree are the following:

- A minimum of two calendar years of full-time study (or the equivalent)
- Course requirements as established on admission, but not less than six half-courses, or equivalent, in total; these requirements must include at least four graduate-level half-courses in engineering and at least one full course in an

appropriate discipline outside the Faculty of Engineering.

- Substantial research
- A thesis on the research: each candidate will be required to make an oral presentation of his/her thesis research and will be examined orally on the subject of the thesis and related fields.

All full-time graduate students and all part-time students actively engaged in research are required to attend departmental seminars held regularly to discuss current research and related topics. Each student is required from time to time to present a seminar on his/her research:

- Each Ph.D. student (full-time or part-time) must obtain satisfactory grades in course work, must make satisfactory progress in the research, and must satisfy the following criteria of activity or "presence" in the program:
- Maintain a close working relationship with the research supervisor
- Attend the courses for which he/she is registered
- Submit written reports and present seminars as required by his/her supervisor
- Attend departmental seminars
- Be readily available on an informal basis.

Advisory Committee

An advisory committee with at least three members will be appointed by the department soon after a student's first registration. It has the responsibility of ensuring that conditions for the pursuit and completion of his/her program are fulfilled and it reviews the student's progress at least once a year.

Comprehensive Examination

The comprehensive examination is held approximately one year after initial registration in the program in the case of full-time students, and at an equivalent time in the case of part-time students. The purpose of the examination is threefold:

- To assess the student's comprehensive knowledge of his/her field of study
- To assess the preparedness and capability of the student for doctoral research
- To judge the suitability of the research topic for a doctoral thesis.

The student is required to present his/her research proposal and to be subjected to oral and written examination in appropriate fields of study. He/she will be informed by the advisory commit-

tee of the specific requirements of the examination. Having successfully completed the comprehensive examination, the student becomes a doctoral candidate.

Transfer from Master's to Ph.D. Program

A student who shows outstanding academic performance and demonstrates high promise for advanced research during the full-time Master's program at Carleton may, subject to meeting the requirements below, be permitted to transfer into the Ph.D. program without receiving the Master's degree. Such a student must complete the course requirements and thesis registration requirements of the Master's program, but is exempted from submission of the thesis.

A student wishing to transfer should apply to the chairman of the department. If the department and the Faculty of Graduate Studies and Research approve the application, the candidate will be required to take the comprehensive examination for the Ph.D. The requirements for the comprehensive examination will then include the submission of a report on research to date and a research proposal for the Ph.D.

After successfully passing the comprehensive examination, the student will be admitted to the Ph.D. program with normal program requirements (but with the comprehensive examination to his/her credit). If unsuccessful, he/she will remain in the Master's program and be required to submit the thesis in the usual way.

Department of Civil Engineering

The Department

Chairman of the Department: John Adjeleian

Departmental Supervisor of Graduate Studies:

J.L. Humar

The Department of Civil Engineering offers programs of study and research leading to the Master of Engineering and Ph.D. degrees in Civil Engineering.

The department conducts research and has developed graduate programs in the following areas:

- **Structural Mechanics**

The graduate program in structural mechanics concentrates on analytical and design studies in the following fields: computer applications in structural analyses; behaviour of steel, concrete and composite structures; structural dynamics, seismic analysis; structural optimization; finite element analysis. Graduate research in structural mechanics is currently directed to the following areas:

Computer Applications in Structural Design

Survey of computer-aided structural design in Canada; computer-based systems for analysis, design and graphics processing

Seismic Analysis and Design

Seismic response of set-back and other irregular buildings; computer analyses of linear and non-linear structural response; design of buildings for seismic forces

Theory of Elasticity

Linear and nonlinear problems in elasticity. Analysis of contact problems in elasticity and plasticity. Finite deformations of rubberlike materials

- **Building Design and Construction**

The graduate program in building design and construction emphasizes the following fields: masonry behaviour and design, timber structures; structural systems and design optimization; integrated treatment of structural, mechanical and electrical building requirements; construction economics, project planning. Graduate research in building design and construction is currently directed to the following areas:

Masonry Behaviour and Design

Shear strength of reinforced masonry beams; masonry deformations; floor systems for masonry structures; winter masonry construction

Timber Structures

Performance, analysis and evaluation of timber truss systems, housing applications

Optimization of Buildings

Optimum design of reinforced concrete and other composite construction taking into account structural, architectural and other service constraints

- **Transportation Planning and Technology**

The graduate program in transportation planning and technology deals with problems of policy, planning, economics, design and operations in all modes of transportation. In the area of transportation planning, the focus is on the design of transport systems, including terminals, modelling and simulation, urban and regional studies, traffic engineering and geometric design. In the transportation technology area, programs deal with technology of vehicles and facilities, acoustics and noise, materials and pavement design. Graduate research in transportation is currently focused on the following areas:

Transport Policy

Assessment and impact analysis of national, regional and urban transportation policies

Planning and Design Methodology

Development and application of models for optimization of transport supply, transportation system management

Travel and Traffic Analyses

Behavioural theories of passenger travel, goods movement, empirical traffic studies

Transportation Terminals

Airport planning, air terminal design; bus, rail, subway terminal design, layout methods, pedestrian traffic

Transportation Technology Development and Assessment

Modernization of passenger and freight rail services; soil properties, pavement design, multi-layered systems, highway design, energy

- **Geotechnical Engineering**

The graduate program in geotechnical engineering places an emphasis on both theoretical and applied problems related to soil and rock mechanics and foundation engineering. These generally include the study of mechanical properties of soil and rock materials, stability of natural slopes and earth embankments, soil-foundation-structure interaction and problems in foundation design and geomechanics. Broader programs in geotechnical engineering may be arranged by making use of courses given in the Department of Geography at Carleton University and in the Department of Civil Engineering at the University of Ottawa. Graduate research in geotechnical engineering is primarily directed towards the following areas:

Soil-Foundation Interaction

Elastic and consolidation effects of soil-foundation interaction; soil-frame interaction; contact stress measurement; performance of rigid and flexible foundations

Bearing Capacity and Settlement

Problems related to design of bridge abutments and footings located on sloped granular fill, experimental and field studies

In-Situ Testing of Soils

The use of devices such as the pressure meter, the screw plate test and the borehole shear device in the assessment of geotechnical properties of soils

Mechanical Behaviour

Development of constitutive relations for soils and rock masses with yield and creep characteristics; applications to foundation engineering

Mechanics of Geological Structures

Large strain phenomena; buckling of strata; applications to underground storage structures

Performance of Anchors

Theoretical and experimental analysis of deep and shallow anchors in soil, rock and concrete; group action; creep effects; prestress loss

Laboratory facilities include a 400,000 lb. universal testing machine with auxiliary equipment for load and strain control; an electro-hydraulic servo-controlled testing system of 100,000 lb. dynamic capacity; a 10,000 lb. fatigue

testing machine, specialized equipment for torsion and impact studies; advanced equipment for electric resistance strain gauge work; and a wide selection of other loading, measuring and recording equipment for testing structural materials and components. The concrete laboratory has facilities for the casting, curing and testing of reinforced concrete members. Laboratory facilities in geotechnical engineering include both large scale and conventional tri-axial testing, consolidation testing, pore water pressure measurements, and model studies of contact stress measurements. The soil dynamics and highway materials laboratories provide facilities for studies of the physical properties of soil, stabilized soil, aggregate and bituminous mixtures.

Computer-related equipment within the department comprises five terminals, including two storage scope display terminals, and a digitizing table. This equipment is interfaced to the Honeywell Level 66 computer in the University computer centre. A library of computer programs for structural engineering is a significant resource for advanced study and research.

Master of Engineering

Admission Requirements

The normal requirements for admission to the Master's program are outlined in the Faculty of Engineering and general sections of this calendar.

Program Requirements

The Master's program may be undertaken in one of the following optional patterns:

- By course work: 12 half-courses including the project course Engineering 82.590
- With thesis: normally seven half-courses and a thesis.

In either pattern, the program must be approved by the department.

The course work Master's program in civil engineering is intended for students whose career objectives are best satisfied by a somewhat broader extension of their engineering background knowledge than that offered by a more specialized program. The variety of courses offered allows the

student either to attain a depth of study in more than one field or to concentrate in one major area. The program has been structured so that it is possible to complete the course of study in one academic year.

Please refer to the Faculty of Engineering section of the calendar for details of the program requirements.

Doctor of Philosophy

Admission Requirements

The normal requirements for admission to the Ph.D. program are outlined in the Faculty of Engineering section of this calendar.

Program Requirements

The specific program requirements for the Ph.D. degree are listed in the Faculty of Engineering section of this calendar.

The program for each candidate will be developed by his advisory committee and must be approved by the department.

Graduate Courses*

- Engineering 82.511F1

Introductory Elasticity

Stresses and strains in a continuum; transformations, invariants; equations of motion; constitutive relations, generalized Hooke's Law, bounds for elastic constants: strain energy, superposition, uniqueness; formulation of plane stress and plane strain problems in rectangular Cartesian and curvilinear co-ordinates; Airy-Michell stress functions and Fourier solutions, application of classical solutions to problems of engineering interest.

A.P.S. Selvadurai.

- Engineering 82.512W1

Advanced Elasticity

Continuation of topics introduced in 82.511. Complex variable solutions. Torsional and thermal stresses; axially symmetric three-dimensional problems, Love's strain potential, Boussinesq-Galerkin stress functions: problems related to infinite and semi-infinite domains. Introduction to numerical methods of stress analysis, comparison of solutions.

Prerequisite: Engineering 82.511 or permission of the department.

A.P.S. Selvadurai.

- Engineering 82.513W1

Finite Element Methods in Stress Analysis

Finite element theory and numerical methods. Constant strain triangles. Linear strain triangles. Reinforced triangles. Axi-symmetric shells. Axi-symmetric solids. Plates in bending. Throughout the course, application to engineering problems is emphasized.

W.H. Bowes.

- Engineering 82.514W1

Earthquake Analysis and Design of Structures Structural dynamics, single and multidegree of freedom systems, formulation of equations of motion, free and forced vibrations, normal mode analysis. Seismological background, selection of design earthquake. Deterministic analysis of earthquake response, linear and nonlinear analysis, influence of foundation medium. Design considerations and code requirements, equivalent static load method, response spectrum approach. J.L. Humar.

- Engineering 82.523W1

Theory of Structural Stability

Elastic and inelastic behaviour of beam-columns; elastic and inelastic buckling of frames; application of energy methods to buckling problems; lateral-torsional buckling of columns and beams; buckling of plates; local buckling of columns and beams.

Prerequisite: Engineering 82.525 or equivalent.

- Engineering 82.524F1

Behaviour of Steel Structures

Steel as a structural material; bolted and welded connections; brittle fracture and fatigue; members

*F,W,S indicates term of offering.

Courses offered in the fall *and* winter (or any other two terms) will be followed by T.

The number following the letter indicates the credit weight of the course: 1 denotes a half-course credit, 2 denotes a full-course credit, etc.

subjected to combined bending and compression, and to twist and local buckling; structural stability of frames.

N.M. Holtz.

- Engineering 82.525F1

Analysis of Elastic Structures

Application of matrices to structural analysis; force and displacement method of analysis for framed elastic planar and space structures; introduction to structural dynamics.

J.L. Humar.

- Engineering 82.526W1

Prestressed Concrete

Outline and scope of design concepts. Flexural behaviour, shear, bond, losses. End block design. Post tensioned slabs. Some considerations on bridge design. Pavements. Design optimization.

Prerequisite: Engineering 82.528 or permission of the department.

J.J. Salinas.

- Engineering 82.527W1

Advanced Structural Design

A number of topics, such as the evolution of a structure, structural form, aesthetics, progressive collapse, and design in various structural materials, are treated by members of the department and outside experts.

John Adjeleian and G.T. Suter.

- Engineering 82.528F1

Advanced Reinforced Concrete

The research background, development, and limitations in current building code provisions for reinforced concrete; yield line theory of slabs; safety and limit states design; computer design of concrete structures.

G.A. Hartley.

- Engineering 82.529S1

Case Studies in Geotechnical Engineering

The critical study of case histories relating to current procedures of design and construction in geotechnical engineering. The importance of instrumentation and monitoring field behaviour will be stressed. In-situ testing.

G.C. McRostie.

- Engineering 82.530F1

Advanced Soil Mechanics I

Effective stress, pore pressure parameters, saturated and partially saturated soils; seepage; permeability tensor, solutions of the Laplace equation; elastic equilibrium; anisotropy, non-homogeneity, consolidation theories; shear strength of cohesive and cohesionless soils.

A.P.S. Selvadurai.

- Engineering 82.531W1

Advanced Soil Mechanics II

Plasticity in soil mechanics; failure and yield criteria, plastic equilibrium, upper and lower bound solutions, uniqueness theorems; statically and kinematically admissible states; stability analysis of cohesive and cohesionless soils.

A.P.S. Selvadurai.

- Engineering 82.533F1

Pavements and Materials

An analysis of the interaction of materials, traffic and climate in the planning, design construction, evaluation, maintenance and rehabilitation of highway and airport pavements.

D.R. MacLeod.

- Engineering 82.534F1

Intercity Transportation, Planning and Management

Current modal and intermodal issues including energy. Framework and process of intercity transport planning and management. Recent trends and system development. Passenger and freight demand and service characteristics. Future prospects and possibilities.

A.M. Khan.

- Engineering 82.535F1

Traffic Engineering

Introduction to principles of traffic engineering. Basic characteristics of drivers, vehicles, and traffic. Volume, speed and delay studies. Traffic stream characteristics and queueing theory. Capacity analysis of roads and intersections. Safety.

J.P. Braaksma.

- Engineering 82.536W1

Highway Materials

Materials characterization and strength evaluation of soils, stabilized soils, aggregates and asphalt concrete. Effects of low temperatures and frost on materials behaviour.

D.R. MacLeod.

- Engineering 82.537S1

Urban Transportation Planning and Management

Urban transportation systems planning and management. Urban development models - an introduction. Urban transportation policy.

W.F. Johnson.

- Engineering 82.538W1

Geometric Design

Basic highway geometric design concepts. Vertical and horizontal alignment. Cross-sections. Interchange forms and design. Adaptability and spacing of interchanges. Design of operational flexibility; operational uniformity, and route continuity on freeways.

D.R. MacLeod.

- Engineering 82.539W1

Intercity Transportation Supply

Advanced treatment of intercity transportation planning and management concepts and techniques: transport supply issues, capacity and costs, evaluation of system improvements and extensions, transportation and development, policy impact analysis.

A.M. Khan.

- Engineering 82.541S1

Transportation Economics and Policy

Transportation, economic analysis framework. Transport industry output. Carrier operations. Issues of resource utilization, measurement, economics of supply of infrastructure, pricing; subsidies, externalities. Transport policy in Canada.

Zis Haritos.

- Engineering 82.550F1

Earth Retaining Structures

Approaches to the theoretical and semi-empirical analysis of earth retaining structures. Review of the earth pressure theories. Analysis and design

methods for rigid and flexible retaining walls, braced excavations and tunnels. Instrumentation and performance studies.

G.E. Bauer.

- Engineering 82.551W1

Foundation Engineering

Review of methods of estimating compression and shear strength of soils. Bearing capacity of shallow and deep foundations. Foundations in slopes. Pile groups. Use of in-situ testing for design purposes. Instrumentation and performance of prototype structures. Design codes.

G.E. Bauer.

- Engineering 82.560S1

Project Management

Introduction to managing the development, design, and construction of buildings. Examination of project management for the total development process, including interrelationships among owners, developers, financing sources, designers, contractors and users; role and tasks of the project manager; setting of project objectives; feasibility analyses; budgets and financing; government regulations; environmental and social constraints, control of cost, time and content quality and process; human factors.

William Dawson.

- Engineering 82.563S1

Computer-Aided Design of Building Structures

Relevant aspects of computer systems, information handling, auxiliary storage; design methods, computerized design systems; computer graphics; application of structural theory; examination of a selected series of structural engineering programs and programming systems.

E.W. Wright.

- Engineering 82.570F1, W1, S1

Special Topics in Building Design and Construction

Courses in special topics related to building design and construction, not covered by other graduate courses, may be offered from time to time. Course details will be available some months prior to registration.

Topics for Spring 1982

- Advanced Finite Element Analysis in Solid Mechanics
Variational formulation of finite element method. Review of indicial notation. Curvilinear co-ordinates; nonlinear material problems and nonlinear geometrical problems.

G.A. Hartley.

- Engineered Masonry Behaviour and Design
Properties of brick, block, mortar, grout and steel. Testing, field control and inspection. Structural behaviour and design of plain and reinforced masonry walls, beams and columns. High rise design and earthquake requirements.

G.T. Suter.

- Engineering 82.572F1, W1, S1

Special Topics in Geotechnical Engineering
Courses in special topics in geotechnical engineering, not covered by other graduate courses, may be offered from time to time. Course details will be available some months prior to registration.

Topic for Spring 1982

- Analysis of Embankments and Slopes
Stability of embankments of soft clays; stress-strain analysis; anisotropy; strain rate effect; short and long-term settlement; methods of slope stability analysis; progressive failure; use of stability charts; slope analysis for residual and unsaturated soils.

K.T. Law.

- Engineering 82.574F1, W1, S1

Special Topics in Transportation Planning and Technology

Courses in special topics in transportation engineering, not covered by other graduate courses, may be offered from time to time. Course details will be available some months prior to registration.

Topic for Fall 1981

- Airport Planning
Framework for airport planning and design. Aircraft characteristics; demand forecasting; airport site selection; noise, airside capacity; geometric design; the passenger terminal complex; cargo area; general aviation; ground transportation; land use planning.

J.P. Braaksma.

Topic for Spring 1982

- Terrain Assessment
Air photo interpretation to evaluate the physical environment for engineering and environmental planning studies. Engineering significance of land-forms and materials.

D.R. MacLeod.

Topic for Fall 1982

- Transportation Terminals
Framework for passenger terminal planning and design. Theory: the transfer function and network modelling; pedestrian flow characteristics; capacity of corridors, stairs, escalators and elevators; layout planning. Practical applications: air, rail, metro, bus, ferry, and multi-modal terminals.

J.P. Braaksma.

- Engineering 82.590F2, W2, S2

Civil Engineering Project

Students enrolled in the M.Eng. program by course work will conduct an engineering study, analysis, or design project under the general supervision of a member of the department.

- Engineering 82.596F1, W1, S1

Directed Studies

- Engineering 82.599F3, W3, S3
M.Eng. Thesis

- Engineering 82.699F, W, S
Ph.D. Thesis

 Courses Not Offered in 1981-82

- 82.512 Advanced Elasticity
82.523 Theory of Structural Stability
82.540 Case Studies in Traffic Engineering

 Other Courses of Particular Interest

Mechanical and Aeronautical Engineering

- 88.514 Ground Transportation Systems and Vehicles
88.517 Experimental Stress Analysis
88.521 Methods of Energy Conversion
88.550 Advanced Vibration Analysis

- 88.561 Design Theory and Practice
- 88.562 Failure Prevention
- 88.568 Deformation of Materials

Systems and Computer Engineering

- 94.501 Simulation and Modelling
- 94.515 Socioeconomic System Models

Geography

- 45.415 Slope Development: Forms, Processes and Stability
- 45.417 Glacial Geomorphology
- 45.533 Periglacial Geomorphology
- 45.534 Aspects of Clay Mineralogy and Soil Chemistry
- 45.579 Research and Development in Recreational Geography

Public Administration

- 50.510 Management Accounting
- 50.511 Financial Management

Department of Civil Engineering, University of Ottawa

- CVG 5100 Foundations
- CVG 5101 Analysis of Stress and Strain in Rock Masses
- CVG 5104 Soil Testing and Properties
- CVG 5105 Slope Stability
- CVG 5106 Soil Engineering
- CVG 5147 Theory of Plates
- CVG 5148 Theory of Shells
- CVG 5341 Finite Element Methods I
- CVG 5349 Mine Waste Embankments

The Department

Chairman of the Department: A.R. Boothroyd

Departmental Supervisor of Graduate Studies:

M.A. Copeland

The Department of Electronics offers programs of study and research leading to the Master's and Ph.D. degrees in electrical engineering.

Areas of specialization include the following interrelated fields:

Integrated Circuit Engineering

Design and development of linear and digital integrated circuits, fabrication processes and test techniques; Bipolar and MOS ICs; CCDs; VLSI, computer-aided circuit design; scanning electron microscopy; laser annealing studies

Solid State Devices

Semiconductor device development; device modelling; device innovation; new device processes; sensors and transducers; special devices for instrumentation; small geometry devices

Solar Energy Conversion

Photovoltaics; solar cells; materials studies for solar cells; arrays; systems for electricity generation; instrumentation for energy systems

Circuits and Circuit Theory

Active filters; linear and nonlinear circuit design; computer-aided circuit design

Microwave Electronics

Microwave amplifiers, oscillators, modulators, frequency converters, phase-shifters; use of FET and bipolar transistors, Schottky barrier varactor, step recovery and PIN diodes; design using finline, microstrip, stripline, coax, and waveguide

Communications Electronics

Circuits for terrestrial and satellite communications; circuit implementation of digital modulation techniques; characterization of nonlinearities in circuits; mobile radio; spacecraft antenna design; communication channel characterization; optical communications circuits

Industrial Instrumentation Electronics

Industrial measurement and process control; radar remote sensing; application of basic electromagnetics and circuit technology

Technology of Analog Signal Processing

Switched capacitor filters, transversal filters, CCD delay lines, use in analog signal processing applications

The structure of courses offered allows a well-integrated Master's or Ph.D. program of study to be chosen, appropriately related to the field of thesis research. Basic courses cover semiconductor device theory, circuit and electromagnetic theory. Application-oriented courses include integrated circuit design, instrumentation techniques, communication circuits, microwave measurements and circuits, semiconductor device design and fabrication processing, and microprocessor electronics.

The research program of the department is conducted in the Electronics Research Laboratory, the function of which is to promote, co-ordinate and organize research in the above-listed fields. The laboratory maintains extensive collaboration with government and industrial research and development agencies in the Ottawa area.

Excellent facilities are available for the fabrication of solid state devices and integrated circuits for research purposes. These include a laboratory in which processes required in silicon monolithic technology can be carried out under conditions of cleanliness and control comparable with those in industrial research laboratories. Among equipment items available are modern diffusion furnaces, an epitaxial reactor system, a high power cw Argon laser for laser annealing of silicon, facilities for photolithography and mask-making, systems for thin and thick film deposition, scribing and bonding. Well-developed laboratory capability exists for the testing and assessment of semiconductor devices and integrated circuits, including probing and SEM facilities. An extensive facility for photovoltaics research includes a microcomputer-controlled solar simulator for AM0, AM1 and AM2 solar spectra.

The department is well equipped for circuit and measurement work over the range from dc through 18 GHz, and including optical frequencies. Sophisticated special purpose facilities include network analyzer systems, amplitude analyzers, spectrum analyzers, a microwave link analyzer, time domain reflectometers, HF and microwave frequency counters, signal sources and microwave sweepers, power meters, high-quality data recorders,

a data generator and bit error rate detector system, and a wide selection of components and adapters spanning the frequency from dc to 18 GHz.

Master of Engineering

Admission Requirements

The normal requirements for admission to the Master's program are outlined in the Faculty of Engineering and general sections of this calendar.

Program Requirements

The Master's program may be undertaken in one of the following optional patterns:

- With thesis: normally six half-courses and a thesis

- By course work: 12 half-courses, no thesis
- Co-operative program: 12 half-courses or equivalent, including two "work term projects", each carrying one full course credit; no thesis.

In each pattern, the program must be approved by the department. The courses to be taken by each student will be worked out on an individual basis by the student's faculty adviser.

To qualify for entry into the degree program by course work (second option), usually at least two years of appropriate engineering experience will be required.

The co-operative program (third option) is operated jointly with firms and laboratories in the Ottawa area who "sponsor" the student, and with whom he carries out his work-term projects. To participate in the program, the student must gain acceptance of both the Department of Electronics and the sponsoring organization.

All full-time students are required to attend departmental seminars, and those in the thesis program are required to present at least one seminar on their research.

Doctor of Philosophy

Admission Requirements

The normal requirements for admission to the Ph.D. program are outlined in the Faculty of Engineering section of this calendar.

Program Requirements

The specific program requirements for the Ph.D. degree are the following:

- A minimum of two calendar years of full-time study (or the equivalent); course requirements as established on admission. Normally not less than six half-courses or equivalent will be required; these must include at least four graduate-level half-courses in engineering and at least one full course in an appropriate discipline outside the Faculty of Engineering.
- Substantial research
- A thesis on the research; each candidate will be required to make an oral presentation of his/her thesis research and will be examined orally on the subject of his/her thesis and related fields.
- Satisfactory completion of a comprehensive examination, approximately one year after initial registration in the program if full-time and, at an equivalent time in the case of part-time students. The purpose and nature of the comprehensive examination are outlined in the Faculty of Engineering section of this calendar.
- Attendance at departmental seminars and presentation by the candidate of at least one seminar on his/her research.

Additional information on the Ph.D. program may be found in the Faculty of Engineering section of this calendar.

The program for each candidate will be developed by his/her advisory committee and must be approved by the department.

Graduate Courses*

- Engineering 97.541W1

Solar Electricity Generation

This course gives a comparative study of devices and techniques of solar electricity generation. Basics of solar energy (spectrum, insolation, etc.); photovoltaics, with special emphasis on silicon

*F,W,S indicates term of offering.

Courses offered in the fall *and* winter (or any other two terms) will be followed by T.

The number following the letter indicates the credit weight of the course: 1 denotes a half-course credit, 2 denotes a full-course credit, etc.

solar cells; arrays and systems; concentration; solar ponds; power towers; solar thermal power stations; windmills; comparison with conventional hydro, coal, oil, and nuclear generating stations. Cost evaluation. Prognosis for the future.
R.E. Thomas.

- Engineering 97.551F1

Passive Microwave Circuits

Circuit aspects of passive microwave components and systems, with emphasis on concepts employed in the design and use of passive microwave devices. Review of EM theory, transmission lines and waveguides. Microwave network analysis. Scattering-matrix characterization of reciprocal microwave junctions and discontinuities. Ferrites, non-reciprocal junctions, isolators and circulators. Design, characteristics and use of microwave components, such as transformers, filters, hybrids, tuners, and directional couplers, with particular emphasis on their realization in stripline and microstrip integrated circuits.

B.A. Syrett.

- Engineering 97.555F1

Passive Circuit Theory

General description of networks, leading to matrix representation of n-terminal lumped and distributed networks. Elements of matrix algebra as applied to networks. Properties of network functions; poles and zeros of driving point and transfer functions. Foster and Cauer canonic forms. Synthesis of lossless two-ports; single and double-terminated. Modern filter theory; approximation of characteristics by rational functions; Butterworth and Chebyshev approximations.

P.D. van der Puije.

- Engineering 97.557W1

Active Circuit Theory

Characterization of negative resistance one-port networks; signal generation and amplification. Active two-ports; y , z , h , k , chain and scattering parameters. Measurement of two-port parameters. Activity and passivity; reciprocity, non-reciprocity and anti-reciprocity. Gyrator as a circuit element. Stability, inherent and conditional; power gain of conjugate and mismatched two-port amplifiers. Amplifier gain sensitivity. Oscillators, maximal loading and frequency sensitivity. Active filter design; gyrator, negative immittance converter (NIC) and operational amplifier used as functional

elements. Practical realization of gyrators and NICs. Active network synthesis.

Prerequisite: Engineering 97.555 or equivalent.

P.D. van der Puije.

- Engineering 97.559F1

Integrated Circuit Technology

Processes used in fabrication of silicon planar devices and integrated circuits. Crystal growth, epitaxy, thermal oxidation, solid state diffusion, ion implantation, vacuum processes, photolithography, optical, E. beam and X-ray, chemical etching and plasma etching, laser annealing. Process characterization and simulation. Limitations. Process-related design rules for discrete devices and integrated circuits. Methods of material, process and device assessment. Thick and thin film technology. Technology for VLSI.

R.E. Thomas.

- Engineering 97.562F1

Microwave Solid State Electronics

Discussion of basic principles of operation of varactor diodes, parametric amplifiers, p-i-n diodes, microwave switches, limiters and phase shifters. Schottky barrier devices, detector and mixer circuits. Avalanche transit-time microwave diodes, bulk gallium arsenide devices, microwave transistors, applications.

B.A. Syrett.

- Engineering 97.563W1

Communications Technology

The course emphasizes the design and analysis of satellite and ground station communication systems, coaxial cable systems, FM line-of-sight microwave links, CATV systems, digital data transmission systems and HF communications, troposcatter and video transmission techniques and systems. Particular attention is given to the concepts of noise, the effects of nonlinearities, and the various modulation techniques.

W.J. Chudobiak.

- Engineering 97.564W1

Advanced Instrumentation Techniques

The study and design of electronic systems for industrial and earth resource non-contacting measurement applications. Emphasis will be on the physical and mathematical modelling of the parameters and materials of interest in addition to the synthesis of measurement systems. Possible

topics include systems for high accuracy material thickness determination, range and velocity resolution, object detection, intrusion detection, moisture content determination, geophysical applications, and other topics selected from the current literature. Particular attention will be given to RF, microwave, and radar techniques.

W.J. Chudobiak.

- Engineering 97.565F1

Fiber-Optical Communications

Transmission characteristics of optical waveguides; electroluminescent sources, such as light-emitting diodes, gallium arsenide lasers and gas lasers; photo-diodes, avalanche detectors; external beam modulators; repeater design; coupling devices for fibers; noise generation and measurements; intermodulation, crossmodulation, and nonlinearity characterization; analog systems, digital systems, system design accounting for component signal degradation; free space links; data bus systems; introduction to integrated optics.

F.P. Kapron, J.C. Dymont, Jan Conradi and C.W.C. Anderson.

- Engineering 97.566W1

Communication Circuits

Phase locked loop characteristics, such as stability, noise performance, tracking, acquisition, and optimization. Radio frequency circuits, such as RF mixers, amplitude modulators and demodulators, frequency modulators and demodulators. Noise suppression techniques, such as shielding, grounding, balancing, and decoupling.

J.S. Wight.

- Engineering 97.567F1

Antenna and Array Engineering

Design parameters, such as power pattern, radiation intensity, directivity, gain, beam area, radiation resistance. Structures, such as infinitesimal linear element, thin linear antenna, rhombic, log periodic, loop, helical, slot, microstrip, horn, and reflector antennas. Baluns, feeders, masts. Receiving antennas. Aperture fundamentals, sampled aperture. Array fundamentals, periodic, Chebyshev, aperiodic and random arrays. Adaptive beam forming.

J.S. Wight.

- Engineering 97.568W1

Electronic Measurements and Instrumentation

Measurement of basic electronic circuit and system quantities in the band 30 kHz - 30 GHz: frequency, voltage, current, impedance, phase, circuit Q, power, gain, attenuation, dynamic range, distortion, sensitivity, SNR and BER. Instrumentation discussed will include signal generators, detectors, general- and special-purpose oscilloscopes, RF bridges, frequency counters, voltmeters, spectrum analyzers, network analyzers, TDR and automated measurement systems.

B.A. Syrett.

- Engineering 97.569W1

Nonlinear Microwave Devices and Effects

Desirable and undesirable effects in nonlinear microwave devices, including varactors, bipolar transistors and FETs, step-recovery and tunnel diodes. Exploitation of nonlinearities in mixers, efficient amplifiers, VCOs and circuits employing negative-resistance and parametric effects. Practical circuit realizations. Theoretical aspects, including differential equations and their solution, phase plane, singularities and limit cycles. Piecewise — linearization. Time-domain solutions. Undesirable nonlinear effects, such as harmonics, active and passive intermodulation, cross-modulation, gain compression and AM-to-PM conversion. Treatment of IM using Volterra and Bessel series.

R.G. Harrison.

- Engineering 97.580F1

Theory of Semiconductor Devices

Review of solid state physics underlying device mechanisms. Equilibrium and non-equilibrium conditions in a semiconductor. Physical theory of basic semiconductor device structures and aspects of design: PN junctions and bipolar transistors; field effect devices. Basic current transport relationships. Charge control theory. Modelling of device mechanisms. Performance limitations of transistors.

A.R. Boothroyd.

- Engineering 97.581F1

Electronic Circuit Reliability

Basic considerations in electronic circuit reliability, with particular reference to integrated circuits. Introduction to reliability statistics. Probability

density distribution functions (for example, Gaussian, Log normal, Weibull, etc.). Failure analysis. Determination of confidence limits, risk, MTFB, MTTF, estimators and Bathtub Curve. Reliability assurance. Reliability physics. Failure causes, modes and mechanisms in semi-conductor devices and ICs. Reaction kinetics (the Arrhenius relationship). Reliability testing of ICs. Environmental screen tests. Burn-in. Life tests, electrical testing. Functional testing. Cost considerations. Advanced failure analysis tests (for example, SEM, X-ray, microprobe, ion probe). Semiconductor test structures. Selected examples. Special emphasis on LSI systems.

D.V. Sulway.

- Engineering 97.582W1

Surface-Controlled Semiconductor Devices
Review of the theory of semiconductor surfaces and interfaces. Surface characterization. Surface recombination. Study of surface dependent devices: MIS capacitors, gate controlled (field plate) diodes, MOS transistors. MIS memory elements, metal-semiconductor contacts. Complementary MOS transistors. Charge-coupled devices. Schottky barrier devices. Surface effects in shallow junctions and lateral bipolar transistors. Special devices.

Prerequisite: Engineering 97.580 or equivalent.

R.E. Thomas.

- Engineering 97.584F1

Integrated Circuit Engineering I

Overview of the integrated circuit design process, touching on each of the major tasks. Technologies. Fabrication processes in context of use and influence on end product. Process modelling. Mask making and photolithography. Design and layout rules based on technology. Partitioning of circuits. Review of basic devices in major technologies. Modelling of IC elements and cells (for example, logic gates). Simulation at cell and system level. Design and layout of simple ICs and cells for LSI or VLSI. In-process testing, test inserts and automatic testing of ICs.

J.P. Ellul.

- Engineering 97.585W1

Integrated Circuit Engineering II

Extension of the integrated circuit design procedure to large systems realized in either custom

LSI or with several chips. Study of realization of basic controllers on a chip. Study of system organization on the IC chip — ROM, PROM, RAM, PLA, LSI partitioning. Static and dynamic MOS LSI. Multiplexing. Clocking systems. Design example of a simple integrated circuit controller. M.A. Copeland.

- Engineering 97.586F1

Computer-Aided Circuit Design

The application of computer methods in circuit analysis and design. Topics will include matrix analysis, topological methods, state space techniques, numerical analysis, optimization techniques. dc transient and ac small and large signal analysis of linear and nonlinear circuits. Logic level simulation; circuit delay, hazard detection. Computer-aided testing, fault simulation. Test sequence generation, fault tolerance. A brief overview of analog fault simulation will be given.

J.P. Knight and P.D. van der Puije.

- Engineering 97.587W1

Microprocessor Electronics

This is a course for persons who are familiar with one or more of the common eight-bit microprocessors. Topics such as bit-sliced machines, special purpose peripheral chips, dynamic memory design, CCD and bubble memories, interfacing techniques and timing problems will be covered. Fabrication technology as it affects cost and performance will be discussed.

C.H. Chan and J.P. Knight.

- Engineering 97.588F1

Signal Processing Electronics

CCDs, BBDs, transversal filters, recursive filters, switched capacitor filters, Z domain analysis of filters to meet specifications, interfacing aspects between analog and digital, antialias filtering, A/D and D/A converters, CODECS. Noise in sampled analog circuits, dynamic range, signal to noise ratio. Operational amplifier considerations — in sampled analog circuits. Tradeoffs between sampled analog and digital approaches to signal processing.

M.A. Copeland.

- Engineering 97.589F1, W1

Advanced Topics in Electronics

A course dealing with selected advanced topics of recent interest in the broad field of solid state

devices, electronic circuits and electromagnetics. Specified topics to be announced each year. Course usually given on a seminar basis with students' presentations on assigned topics.

- Engineering 97.590F1, W1, S1

Engineering Project I

A one-term course, carrying half-course credit, for students pursuing the course work M.Eng. program. An engineering study, analysis and/or design project under the supervision of a faculty member. Results will be given in the form of a written report and presented orally.

- Engineering 97.591F2, W2, S2

Engineering Project II

A one-term course, carrying full-course credit, for students pursuing the course work M. Eng. program or the co-operative M.Eng. program. An engineering study, analysis and/or design project under the supervision of a faculty member. Results will be given in the form of a written report and presented orally.

- Engineering 97.596F1, W1, S1

Directed Studies

Various possibilities exist for pursuing directed studies on topics approved by a course supervisor, including the above listed course topics where they are not offered on a formal basis.

- Engineering 97.599F3, W3, S3

M.Eng. Thesis

- Engineering 97.699F, W, S

Ph.D. Thesis

The Department

Chairman of the Department: J.A. Goldak
Departmental Supervisor of Graduate Studies:
James Kirkhope

The Department of Mechanical and Aeronautical Engineering offers programs of study and research leading to M.Eng. degrees in Aeronautical Engineering, Materials Engineering and Mechanical Engineering, and to Ph.D. degrees in Aeronautical Engineering and Mechanical Engineering. The M.Eng. degree can be earned by a combination of course work and thesis or by course work alone.

Programs of research and study can be offered in the three broad areas of thermofluid-dynamics, mechanical analysis and design, and materials. Courses are available in the particular fields of:

- Aerodynamics
- Internal Gas Dynamics
- Heat Transfer
- Noise and Aero-Acoustics
- Stress and Failure Analysis
- Vibration Analysis
- Engineering Design
- Material Properties
- Material Processing
- Vehicle Engineering
- Nuclear Engineering
- Energy Conversion and Utilization
- Energy Systems Planning
- Air and Water Pollution

The departmental research activities are focused on several areas of technology where some of the above fields interact. Programs of study and research may be chosen in one or two of the fields above, or in one of these areas of technology.

The department has a major research commitment, both analytical and experimental, to thermofluid-dynamic and mechanical problems of gas turbine engine design and operation. Current projects include flow prediction and analysis in turbomachines; two- and three-dimensional boundary layer behaviour; dynamics of gas turbine power plants; design and performance of highly loaded turbines; noise generation in fans, compressors and turbines; noise propagation in acoustically treated ducts; stress, deformation and vibration of compressor and turbine blades and

discs; optimum design of blades and discs; finite element analysis; dynamics of high speed rotors; electron beam welding of refractory metals; failure modes of materials in extreme environments.

As part of the faculty interest in transportation, the department is active in research on air and ground vehicle technology. Current studies include computational methods for steady and unsteady potential flows over complex configurations; aircraft noise; boundary layer separation and control; model simulation of snow drifting on airports and roadways; optimization of off-road vehicle design; vehicle-terrain interaction; effect of vibration on vehicle performance; dynamics of air-cushioned and magnetically levitated vehicles; composite material structural elements.

Applied heat transfer research is concentrated in two main areas: one is the study of mixing and heat transfer problems in nuclear power reactors; the other involves studies of solar collectors and solar heating systems with a view to optimizing their design and performance.

Members of the department provide the nucleus of Carleton University's Energy Research Group, which is engaged in interdisciplinary studies on the effectiveness of energy utilization in industrialized societies. In particular, studies are being undertaken on the optimization of nuclear reactor power plants for energy utilization, on energy utilization in transportation, in buildings and in industry, and on the effects of price on energy supply and demand. A related interest in the department is in air- and water-pollution problems associated with energy utilization. Research on coal gasification is also in progress.

Another area of interest of the department is in materials and fabrication technology; in particular, there is a considerable effort in welding metallurgy techniques and in the design of welded structures. In addition, the general area of fracture mechanics and defect design techniques is developing and is applied both to design and materials evaluation. Facilities in this area include an electron beam system, an electron microscope and associated analytical facilities, and fracture mechanics testing equipment.

The departmental laboratories are well equipped for the various research activities described above, and these are supported by a machine shop and an

electronics shop. In addition to the extensive laboratory facilities, the faculty maintains several small computers. The University's central computing facility is based on a twin Sigma-9 computer and a Honeywell Level 66 computer; this facility is used for major computations and is accessible at a large number of remote terminals in the Mackenzie Building.

The extensive laboratory facilities of the National Research Council and of the Department of Energy, Mines and Resources are also used, by special arrangement, for research and graduate studies of mutual interest. Strong contacts are maintained with the gas turbine and nuclear power industries.

Master of Engineering

Admission Requirements

The normal requirements for admission to the Master's program are outlined in the Faculty of Engineering and general sections of this calendar.

Program Requirements

The Master's program may be undertaken in one of the following optional patterns:

- By course work: 12 half-courses
- With thesis: six half-courses and a thesis

In either pattern, the program must be approved by the department.

The course work Master's program in either mechanical or aeronautical engineering is intended for students whose career objectives are best satisfied by a somewhat broader extension of their engineering background knowledge than that offered by a more specialized research program. The course of study will be tailored to suit the career objectives of each student individually, and must show depth of study in more than one field. The ability to do significant work in engineering without detailed supervision is an essential attribute for a holder of a Master's degree. Therefore, one full course of the program is specified to be Engineering 88.598: Independent Engineering Study.

The following course requirements must normally be met for the degree by course work: a total of six full courses or equivalent, of which

- At least one full course or equivalent must be in an area of engineering outside the main field of study
- One full course shall be an independent study (88.598).

Doctor of Philosophy

Admission Requirements

The normal requirements for admission to the Ph.D. program are outlined in the Faculty of Engineering section of this calendar.

Program Requirements

The specific program requirements for the Ph.D. degree are listed in the Faculty of Engineering section of this calendar.

The program for each candidate will be developed by his advisory committee and must be approved by the department.

Graduate Courses*

- Engineering 88.501F1

Theory of Viscous and Turbulent Flows
Navier-Stokes and boundary layer equations; mean flow equations for turbulent kinetic energy; integral formulations. Stability, transition, turbulence, Reynolds stresses; separation. Calculation methods, closure schemes. Compressibility, heat transfer and three-dimensional effects.
G.M. Elfstrom.

- Engineering 88.504F1

Compressible Non-Viscous Flow
Steady isentropic, frictional and diabatic flow; shock waves; irrotational compressible flow, small perturbation theory and similarity rules;

*F, W, S indicates term of offering.

Courses offered in the fall *and* winter (or any other two terms) will be followed by T.

The number following the letter indicates the credit weight of the course: 1 denotes a half-course credit, 2 denotes a full-course credit, etc.

second-order theory, unsteady, one-dimensional flow.

A.N. Abdelhamid.

- Engineering 88.506F1

Theory of Subsonic Flows

Integral formulation of the basic equations of gas dynamics. Boundary conditions for moving surfaces, including surfaces of discontinuity. Regular and singular perturbation problems, with applications to aerofoil theory and viscous flow theory. Linearized subsonic theory with applications to flows about wings and slender bodies. Hodograph methods and higher order theories of compressible subsonic flow.

Prerequisite: Mathematics 70.446 or permission of the department.

(Also offered as Mathematics 70.543)

Paul Mandl.

- Engineering 88.507W1

Theory of Supersonic Flows

The theory of characteristics derived by matrix methods. Applications to one-dimensional unsteady and two-dimensional steady supersonic flows. Wave propagation in shock tubes. Rarefaction and compression waves. Riemann invariants and wave interaction problems. Structure of a shock front. Supersonic sources with applications to wings and bodies. Supersonic flow about oscillating aerofoils.

Prerequisite: Mathematics 70.446 or permission of the department.

(Also offered as Mathematics 70.544)

Paul Mandl.

- Engineering 88.508W1

Experimental Methods in Fluid Mechanics

Fundamentals of techniques of simulation of fluid dynamic phenomena. Theoretical basis, principles of design, performance and instrumentation of ground test facilities. Applications to aerodynamic testing (subsonic to hypersonic speeds); wind effects on structures; air and water pollution.

Julius Lukasiewicz.

- Engineering 88.511F1

Dynamics and Aerodynamics of Low Speed Flight

Brief review of static stability theory. Euler's equations for rigid body motion; the linearized

equations of motion; stability derivatives and their estimation. Longitudinal and lateral dynamic response of an aircraft to control and disturbance. L.T. Filotas.

- Engineering 88.514W1

Ground Transportation Systems and Vehicles

Performance characteristics, handling and directional stability, ride comfort and safety of various types of ground vehicle systems, including road vehicles, terrain-vehicle systems, guided transport systems and advanced ground transport technology. J.Y. Wong.

- Engineering 88.517W1

Experimental Stress Analysis

Introduction to theory of elasticity. Photoelasticity: types of polariscope, two- and three-dimensional stress fields, frozen patterns. Photoelastic coatings. Strain gauges; gauge factors sensitivity, calibration and temperature compensation. Moire fringes, brittle lacquers, mechanical strain gauges.

Robert Bell.

- Engineering 88.521W1

Methods of Energy Conversion

The course covers technical, economic and environmental aspects of developing methods of energy conversion, as applied to large-scale systems. Among topics included are fuel cells, MHD, fusion, solar energy, wind, geothermal and tidal energy. J.T. Rogers.

- Engineering 88.541F1

Turbomachinery

This course deals with the generalized performance of turbomachinery, and with the thermo- and aerodynamic design of axial and radial flow machines. The emphasis is on compressible flow machines.

- Engineering 88.542W1

Gas Turbines

Interrelationship among thermodynamic, aerodynamic and mechanical design. Ideal and real cycle calculations. Cycle optimization; turbo-shaft, turbojet, turbofan. Component performance. Off-design performance; matching of compressor, turbine, nozzle. Twin-spool matching.

B.D. MacIsaac.

- Engineering 88.543F1

Advanced Thermodynamics

Equilibrium; first law, second law, state principle, and zeroth law; criteria of equilibrium, temperature, entropy and availability; Maxwell relations; open systems; phase rule; systems of one and two components; idealized gases, mixtures and solutions; equations of state; thermodynamic potentials; chemical reactions and chemical equilibrium.

E.G. Plett.

- Engineering 88.547W1

Conductive and Radiative Heat Transfer

Analytical, numerical and analog solutions to steady-state and transient conduction heat transfer in multi-dimensional systems. Radiative heat exchange between black, gray, non-gray diffusive and specular surfaces, including effects of athermanous media.

E.G. Plett.

- Engineering 88.550F1

Advanced Vibration Analysis

General theory of discrete multi-degree-of-freedom vibrating systems. Emphasis on numerical techniques of solving complex vibrating systems with selected applications from aeronautical, civil and mechanical engineering.

James Kirkhope.

- Engineering 88.561W1

Design Theory and Practice (Creative Problem Solving)

This course outlines problem-solving processes and how they can be applied in engineering design. The student will be introduced to and be expected to practice various systematic and creative problem-solving techniques. The emphasis is on the student's learning methodologies rather than accumulating information. The techniques may be successfully applied in any engineering specialty.

Geza Kardos.

- Engineering 88.562F1

Failure Prevention (Fracture Mechanics and Fatigue)

The course deals with the design of engineering structures to ensure against failure due to fatigue or brittle fracture. It emphasizes an understanding of the nature of fatigue and brittle fracture, and thereby the selection of suitable material, geometry

and inspection procedures for the load and environmental condition intended.

Geza Kardos.

- Engineering 88.568F1

Deformation of Materials

This is intended to be a general course for mechanical and civil engineers, dealing with the metallurgical and materials principles that control the mechanical properties and deformation of materials. Topics to be covered include elasticity, anelasticity, yield point phenomena, plastic flow, strain hardening, Bauschinger effect, fracture, viscoelastic deformation.

M.J. Bibby.

- Engineering 88.570T1

Special Topics in Mechanical and Aeronautical Engineering

Courses in special topics related to mechanical engineering and aeronautical engineering, not covered by other graduate courses, may be offered from time to time. Course details will be available prior to registration.

James Kirkhope and others.

- Engineering 88.596F1, W1, S1

Directed Studies

- Engineering 88.598F1, W1, S1

Independent Engineering Study

In this course, the student pursuing a Master's degree by course work will carry out an independent study, analysis and solution of an engineering problem or design project. The results will be given in the form of a written report and presented at a departmental seminar. The study will be carried out under the general direction of a faculty member.

James Kirkhope and others.

- Engineering 88.599F3, W3, S3

M.Eng. Thesis

- Engineering 88.699F, W, S

Ph.D. Thesis

Courses Not Offered in 1981-82

- 88.503 Incompressible Non-Viscous Flow
- 88.505 Aerodynamics of Wings and Bodies
- 88.509 Environmental Fluid Mechanics Relating to Energy Utilization
- 88.510 Performance and Economics of Aircraft
- 88.530 Acoustics and Noise
- 88.531 Aero-Acoustics
- 88.548 Convective Heat and Mass Transfer
- 88.549 Two-Phase Flow and Heat Transfer
- 88.566 Introduction to Modern Materials Analysis
- 88.567 Special Topics in Materials Engineering I
- 88.569 Special Topics in Materials Engineering II

- MCG 5127 Advanced Production Planning and Control
- MCG 5128 Industrial Organization
- MCG 5132 Heat Transfer by Convection
- MCG 5134 Heat Transfer with Phase Change
- MCG 5166 Nuclear Engineering Fundamentals
- MCG 5167 Nuclear Reactor Engineering
- MCG 5175 Tribology
- MCG 5191 Combustion

Other Courses of Particular Interest

Civil Engineering

- 82.511 Introductory Elasticity
- 82.512 Advanced Elasticity
- 82.513 Finite Element Methods in Stress Analysis
- 82.534 Transportation Planning I

Systems and Computer Engineering

- 94.501 Simulation and Modelling
- 94.504 Computer Methods in Industrial Engineering
- 94.505 Optimization Theory and Methods
- 94.552 Advanced Linear Systems
- 94.553 Stochastic Processes

Physics

- 75.447 Statistical Physics (Statistical Thermodynamics)

Mathematics and Statistics

- 70.446 Hydrodynamics and Elasticity
- 70.486 Numerical Analysis

Department of Mechanical Engineering, University of Ottawa

- MCG 5112 Rarefied Gas Dynamics
- MCG 5117 Strength and Fracture of Composite Materials
- MCG 5119 Introduction to Fracture Mechanics
- MCG 5125 Fatigue of Materials and Structures

Department of Systems and Computer Engineering

The Department

Chairman of the Department: J.S. Riordon
Departmental Supervisor of Graduate Studies:
S.A. Mahmoud

The Department of Systems and Computer Engineering offers programs of study and research leading to the M.Eng. and Ph.D. degrees in Electrical Engineering; with the participation of the Department of Mechanical and Aeronautical Engineering, M.Eng. and Ph.D. programs are also offered in mechanical engineering. A program leading to the M.Sc. degree in Information and Systems Science is offered in co-operation with the Department of Mathematics and Statistics.

The departmental program centers upon the analysis and design of systems whose primary function is the processing of information. Within this context, four interrelated areas of study receive major attention:

- Computer Communications and Database Systems
- Communications and Signal Processing
- Computer Systems Engineering
- Modelling, Simulation, Optimization and Control

An integrated course program provides students with the fundamental basics, and allows specialization in one or more of the above areas as desired. The research program emphasizes the development and application of modern methods of information systems engineering pertinent to these areas. Work undertaken includes both theoretical studies and the related problems of practicable realizations. Specific research topics are often associated with one or more major projects, such as the Wired City Simulation Laboratory, the Transparent Intelligent Network, and the Speech Research Group.

Computing systems play a central role in the research and teaching activities of the department. The facilities available to the student include interactive time-sharing and remote batch terminals linked to the University's Sigma-9 digital computer and several small- to medium-sized computers available within the department. These include a PDP-15 with interactive graphics, a PDP-11/55, PDP-11/60, GT-44, and GT-40 computer, all with

graphic capability. Also available are a number of PDP-8 computers and several microprocessor systems. Applications include information storage and retrieval, speech processing, image processing/communications, and studies of man-machine communications.

Full advantage is taken within the department of the technology-oriented government/industry/university complex in the Ottawa area. Co-operative projects exist with the Department of Communications, Communications Research Centre, NRC, Bell Northern Research Laboratories, the Ministry of Transport, and COSTPRO.

Students wishing to pursue a computing specialization in systems engineering may be required to take appropriate undergraduate computing science courses for which credit may be allowed.

Master of Engineering

Admission Requirements

The normal requirements for admission to the Master's program are outlined in the Faculty of Engineering and general sections of this calendar.

Program Requirements

Two options are available for the Master's program:

- Thesis program, normally comprising seven half-courses and a thesis
- Non-thesis program, comprising 12 half-courses, and including project course Engineering 94.590 or 94.591, or 94.592.

Certain courses are fundamental to advanced study in the various departmental areas of specialization. These are Engineering 94.552, 94.553, 94.557, and 94.574. All M.Eng. students in systems engineering must complete at least two of these (but may complete more than two if they wish). The most suitable combination of these core courses should be chosen by the student in consultation with his/her program adviser at the time of initial registration.

M.Sc. Program in Information and Systems Science

This is a program administered jointly by the Department of Mathematics and Statistics and the

Department of Systems and Computer Engineering, which leads to an M.Sc. (Information and Systems Science). Intended primarily for students whose first degree is not in electrical engineering, it allows candidates to pursue studies in information systems engineering, communications and signal processing, computing science, or mathematical systems theory.

Applicants who desire admission to the information and systems science program are required to have an Honours degree in a related discipline, with at least three years of mathematics and a strong undergraduate preparation in computer science; otherwise the general regulations apply. The normal program consists of eight half-courses, of which two must be taken in the Department of Mathematics and Statistics, and a thesis.

The program is more fully described on page 124 of this calendar.

Doctor of Philosophy

Admission Requirements

The normal requirements for admission to the Ph.D. program are outlined in the Faculty of Engineering section of this calendar.

Program Requirements

The specific program requirements for the Ph.D. degree are listed in the Faculty of Engineering section of this calendar.

The program for each candidate will be developed by his/her advisory committee and must be approved by the department.

Graduate Courses*

- Engineering 94.501W1

Simulation and Modelling

Simulation of continuous and discrete processes, with emphasis on the latter. Model building. Continuous time systems: analog models, digital approximations; continuous simulation languages. Simulation of discrete event-oriented processes. Specialized simulation languages: GPSS, SIMSCRIPT, GASP, SIMPAC. Monte Carlo methods. Experimental design and statistical analysis of results. J.E. Neilson.

- Engineering 94.504F1

Computer Methods in Industrial Engineering

Linear programming; simplex and revised simplex methods; duality and post optimal analysis; applications in health care delivery; integer programming; network models and algorithms, shortest path and minimum cost flow problems; application to computer communication network routing problems and urban traffic problems; equilibrium traffic assignment, Wardrop's conditions; critical path methods.

Bernard Paturek.

- Engineering 94.505W1

Optimization Theory and Methods

A second-level course in optimization theory and computer-oriented optimization methods. Lagrange's method of undetermined multipliers. Unconstrained optimization: steepest-descent, Newton-Raphson, conjugate gradient, variable metric, and Powell-Zangwill methods. Nonlinear programming: Kuhn-Tucker conditions, saddle point theory and dual problems, computational techniques. Application to nonlinear engineering system identification, network synthesis problems, filter design. Function space techniques and introduction to optimal control.

Bernard Paturek.

*F, W, S indicates term of offering.

Courses offered in the fall *and* winter (or any other two terms) will be followed by T.

The number following the letter indicates the credit weight of the course: 1 denotes a half-course credit, 2 denotes a full-course credit, etc.

- Engineering 94.510W1

Measurements and Models for Computer Systems and Workloads

Measurement and modelling of computer workloads, and of computer operation and performance. Workloads, including timesharing transaction processing, data-flow, and hard-real-time (for example, communications) applications. Benchmarking and load emulators. Typical software, hardware and hybrid performance monitors, interpolation and statistical problems. Stochastic and deterministic models of program structures, schedulers, memories, special processors, and of time-sharing and multiprocessing computers. Use of models via both simulation and analysis.

Prerequisite: Engineering 94.574 and 94.553 (may be taken concurrently).

C.M. Woodside.

- Engineering 94.516W1

Theory of Large Systems and Networks

Examples of networks and a description of engineering problems in their design and analysis. Elements of queueing theory and its application to network problems. Theory of networks and graphs; reliability; simulation; optimization. Application of methods and theories to engineering problems.

Prerequisites: Engineering 94.521, 94.552 and 94.553.

- Engineering 94.517W1

Queueing, Scheduling and Control of Information Systems

Methods for analyzing contention for resources, and the queue disciplines, priorities, and schedulers used for resolving contention. Emphasis is on applicable results, with approximations for complex cases. Markovian analysis of standard simpler single queues and networks, including embedded processes. Networks of queues: product form, mean value analysis, computation, extended product form, Norton's theorem, asymptotic analysis. Scheduling, priority queues, and real-time control, design of queues.

Prerequisite: Engineering 94.553 or equivalent.

C.M. Woodside.

- Engineering 94.518W1

Topics in Information Systems

This course is designed to introduce the research student to recent developments in information systems design.

Prerequisite: Engineering 94.574 or permission of the department.

- Engineering 94.521F1

Computer Communication

Components and structure of computer networks, communications subnetwork: physical, data link and network level protocols, circuit, message and packet switching. Examples of public data networks. Network performance analysis: queueing, concentration, routing and buffering. Topological design, capacity assignment, and network traffic management.

Prerequisite: Engineering 94.553 (may be taken concurrently).

J.S. Riordon.

- Engineering 94.527W1

Distributed Processing Systems

Distributed processing systems definitions, objectives and applications. Protocols: theory and practical limitations, protocol specification and validation techniques. Layered protocol approach. ISO protocol model, session, presentation and application levels. Design examples: interprocess communications, file transfer and distributed databases. Recovery of distributed systems from failure conditions.

Prerequisite: Engineering 94.521.

S.A. Mahmoud.

- Engineering 94.531F1

Software Engineering

This course covers software engineering from the viewpoint of computer systems planners, designers, and project leaders who must work at the leading edge of hardware and software technology to build new systems for new applications. A key component of the course is a logical view of computer system design and description, which can embrace both software and hardware. Topics covered are system design and description techniques and methodologies; system implementation and production tactics and strategy; product control and documentation; and advanced issues.

Prerequisite: Engineering 94.574.

E.L. Sigurdson.

- Engineering 94.532F1

VLSI Systems Engineering

This course is concerned with the totality of activity involved in designing and implementing a system of VLSI components, some of which may be programmable. Design methodologies for conglomerates of VLSI components, standards, and configuration constraints; time/cost estimates; team organization; project control; function partitioning and PALs, macro cells, and other configurable VLSI chips are discussed.

Prerequisite: Engineering 94.558.

B.A. Bowen.

- Engineering 94.533W1

Digital Systems Engineering

This course is concerned with the totality of activity involved in creation of a digital system. It includes as components both hardware and software engineering, and extends these disciplines to an overall system. Topics include system design methodologies and strategies; representation and discipline mechanisms; constraints; reporting and documentation; interface to manufacturing; quality assurance and maintenance; design reviews; sub-specifications of software and hardware, and their integration and control. Examples are drawn from areas such as signal processing, computer communications, and intelligent terminals.

Prerequisites: Engineering 94.531 and 94.532.

B.A. Bowen.

- Engineering 94.534F1

Mini-Micro Applications

This course covers logical design of systems of sequential and concurrent programs for special purpose applications of mini- and microprocessors. Intelligent terminal applications are particularly emphasized. Topics covered include virtual terminals; command decoders; device-independent I/O handlers; high-level communication protocols; office automation functions; and human interface considerations.

Prerequisites: Engineering 94.571 and 94.527.

R.J.A. Buhr.

- Engineering 94.539F1, W1

Advanced Topics in Digital Systems Design

A course dealing with recent and advanced topics in the field of digital systems design and related areas. Students registered in the course are

expected to present one or more lectures or seminars on assigned topics.

Prerequisites: Engineering 94.557, 94.558 and permission of the department.

B.A. Bowen.

- Engineering 94.551W1

Estimation and Detection

Models for time series analysis: autogressive, moving average processes; decision theory; hypothesis testing, likelihood ratio tests; minimum risk, maximum likelihood, and Bayesian estimators; estimation of parameters of time series models, least squares and maximum likelihood, recursive techniques, on-line system identification for process control; Wiener-Kalman filters.

Prerequisite: Engineering 94.552 and 94.553.

Bernard Pagurek.

- Engineering 94.552F1

Advanced Linear Systems

This course is oriented towards students interested in communications, signal processing, and digital processors. Review of basic linear systems: superposition, impulse response, convolution, fundamental properties, frequency response, Fourier transforms, pole-zero diagrams, Bode Diagrams, stability, transient response, Laplace Transforms. Time-frequency relationships: causality, scaling, phase characteristics, time-bandwidth requirements. Band-pass to low-pass transformations, analytic signals, discrete-time systems, the z-Transform. Signal representations and the state-space representation of systems. Linear processing of random signals with applications to filtering estimation.

D.A. George.

- Engineering 94.553F1, W1

Stochastic Processes

Basic concepts of randomness, as applied to communications, signal processing, and queueing systems; probability theory, random variables, stochastic processes; random signals in linear systems; introduction to decision and estimation; Markov chains and elements of queueing theory.

D.C. Coll.

- Engineering 94.554W1

Data Communications I

Digital communications systems: characterization of information and noise signals; source encoding;

communications processes; basic decision theory; optimum receivers. System performance: error probabilities for common digital modulation systems.

Prerequisite: Engineering 94.553 (may be taken concurrently).

D.D. Falconer.

- Engineering 94.557F1

Fundamentals of Discrete Systems

Introduction to the theory and applications of discrete mathematics to the analysis and design of the software and hardware of computers and computing systems. Digital machine theory: group theory and applications to finite state machines; algebras and combinatorial logic design, homomorphic maps and application to group codes; rings and fields and their application to cyclic codes. Graphs: graph and tree structures, directed graphs; applications to reliability, reachability and searches; classes of polynomial complete and incomplete problems with graph representation. Languages and grammars: finite automata, stack structured computers, Polish notation, queueing structures and grammars.

S.A. Mahmoud.

- Engineering 94.558W1

Digital Systems Architecture

The frontier aspects of computer systems architectures, beginning with a detailed assessment of the currently foreseen changes in semiconductor capabilities. New architectural concepts are explored, and typical machines (for example, VAX 11, HP 3000, IBM 38) are considered as examples. New concepts in controller design and in virtual memory systems are explored in some depth, augmented by design examples. Students are expected to undertake a heavy reading program in the current literature and to complete several critiques.

Prerequisites: Engineering 94.574 and 94.457 or equivalent.

B.A. Bowen.

- Engineering 94.562W1

Digital Signal Processing

Signal representations, z-transform and difference equations. Digital filters; recursive design techniques for FIR and IIR filters, quantization effects. Discrete Fourier transform: properties,

correlation and convolution, chirp z-transform. Fast Fourier transform: algorithms and implementation. Random signal analysis: estimators, sampling distributions, averaging, correlation and spectral estimates, windowing for leakage suppression and stability improvement. Hardware and software implementations of digital filters. Speech analysis and synthesis, predictive encoding, and other current applications.

Prerequisites: Engineering 94.552 and 94.553 (may be taken concurrently).

L.R. Morris.

- Engineering 94.565F1

Data Communications II

Review of optimum reception for the non-distorting additive noise channel; intersymbol interference and equalization; discussion of selected topics, such as encoding data for transmission, partial response, error detection and correction; digital modulation systems; timing and synchronization; spread spectrum modulation; radar detection and pulse compression; information theory.

Prerequisite: Engineering 94.554.

D.C. Coll.

- Engineering 94.567W1

Source Coding and Data Compression

Discrete and continuous sources: Markov and filtered noise models; the rate distortion functions. Discrete source coding: Huffman coding, run length encoding; text, black/white television, digitized script. Continuous sources: PCM, DPCM, and delta modulation, tolerance violation coding. Fourier and Walsh transform coding; speech, facsimile, telemetry, television. Speech compression by parameter extraction. Compression by tree coding; discrete sources with fidelity criterion, generalization of delta modulation.

Prerequisites: Engineering 94.552 and 94.553.

J.K. Cavers.

- Engineering 94.571F1

Mini/Microcomputer Operating System Design Theory and practice of structured real time operating system design. Design using high-level concurrent languages and graphical techniques; operating system kernel (nucleus) organization; mapping the kernel onto low-level software and hardware; implementation of operating systems on different hardware architectures, including multiple processor

configurations; conflicting requirements of efficiency, speed, flexibility, modularity; consideration of failure recovery, reliability, integrity, protection; features of standard operating systems (RMS/80, RSX/11 and others). Special purpose operating systems for mini/microcomputers with examples drawn from systems developed or under development at Carleton, using PDP-11 and INTEL-8080 hardware.

Prerequisites: Engineering 94.303 or 94.461, plus 94.574 (or equivalent).

R.J.A. Buhr.

- Engineering 94.572F1

Programming Fundamentals

Topics to be covered include data structures, discrete structures, data types, programming language definition techniques, programming style, program structuring, program correctness proof techniques, recursive programming, program design strategies, debugging strategies, human engineering issues. Programming assignments involving several programming languages.

Prerequisite: Programming experience, with at least one high-level language.

W.R. LaLonde.

- Engineering 94.573W1

Integrated Database Systems

Physical and logical storage structures; database architecture; logical models of databases; the relational model; relational algebra and calculus; normal forms. Hierarchical model; IMS as an example. Network model; CODASYL DBTG approach; EDMS as an example. Design issues in distributed databases.

Prerequisite: Engineering 94.574.

J.S. Riordon.

- Engineering 94.574F1

Elements of Computer Systems

Computer systems from a software point of view. System organization: hierarchical multi-level machines, the conventional machine level, the microprogramming level, the operating system level, translator levels. Operating system design: co-operating sequential processes, semaphores, monitor, O/S kernel, handlers. Discrete structures: logical organization, physical organization, sorting and searching.

Prerequisite: Programming experience, with at least one high-level language and, preferably, with assembly language.

J.E. Neilson.

- Engineering 94.575W1

Software Translators and Their Applications

Concepts efficiency, expandability, correctness, and compactness. Application in query and edit systems, intelligent terminals, file translations, the design of input/output specifications. Scanners, finite state machines, grammars, parsers, code generators. A significant project to implement a non-trivial translator will be required, involving complex data structures, searching and sorting, overlaying strategies, error detection and recovery strategies, interfacing with operating systems and human engineering.

Prerequisites: Engineering 94.574 or 94.480 and 94.481.

W.R. LaLonde.

- Engineering 94.576F1

Analytical Performance Models of Computer Systems

Analytical modelling techniques for performance analysis of computing systems. Theoretical techniques covered include single and multiple class queueing network models, together with a treatment of computational techniques, approximations and limitations. Applications include scheduling, memory management, peripheral devices, databases, multiprocessing, and distributed computing.

Prerequisite: Engineering 94.553.

R.J.A. Buhr and J.E. Neilson.

- Engineering 94.577W1

Teleprocessing Software Design

Review of basic teleprocessing functions and subsystems: code conversion, line control, error control, synchronization. Teleprocessing devices and networks. Data communications systems and host computer interface configurations. Modular software design for front-end processors, message switches, remote concentrators and intelligent terminals.

Prerequisite: Engineering 94.574 and 94.521.

S.A. Mahmoud.

- Engineering 94.579F1, W1

Advanced Topics in Software Engineering

A course dealing with recent and advanced topics in the field of software engineering and related areas. Primary references are recent publications in the field. Students registered in the course are expected to present one or more lectures or seminars on assigned topics.

Prerequisite: Engineering 94.572 and permission of the department.

R.J.A. Buhr.

- Engineering 94.582W1

Topics in Information and Systems Science

Fundamental results in design and analysis of efficient computer algorithms for large, complex problems. Areas of application include data manipulation, computer networks, queueing systems, and optimization.

(Also offered as Mathematics 70.582)

R.J.A. Buhr and Frantisek Fiala.

- Engineering 94.584F1, W1

Advanced Topics in Communications Systems

Recent and advanced topics in communications systems. Students registered in the course are expected to present one or more lectures or seminars on assigned topics.

Prerequisite: Engineering 94.565 and permission of the department.

D.A. George.

- Engineering 94.589W1

Advanced Topics in Measurements and Models

Recent and advanced topics in optimization, queueing theory, dynamic systems, estimation for systems analysis, the theory of networks, and similar areas. A seminar course for Ph.D. students and (with permission) advanced Master's students.

Bernard Pagurek and C.M. Woodside.

- Engineering 94.590F1, W1, S1

Systems Engineering Project

Students pursuing the non-thesis M.Eng. program will conduct an engineering study, analysis, and/or design project under the supervision of a faculty member. Results will be given in the form of a typewritten report and presented at a departmental seminar.

- Engineering 94.591F2, W2, S2

Systems Engineering Project

Project similar to 94.590 but either of greater scope or longer duration. Results will be given as a typed report and presented in a seminar.

- Engineering 94.592T2

Systems Engineering Project

(Same description as 94.591, but spread over two terms)

- Engineering 94.596F1, W1, S1

Directed Studies

- Engineering 94.599F3, W3, S3

M.Eng. Thesis

- Engineering 94.699F, W, S

Ph.D. Thesis

The School

Director of the School: M.R. Coote

The School of Architecture does not offer a program of studies at the graduate level. However, it does offer graduate courses, and members of the school participate in graduate programs offered by the Department of Civil Engineering, the Institute of Canadian Studies, the Faculty of Environmental Studies at York University, the Centre for Building Studies at Concordia University, and the Faculté de l'Aménagement at the Université de Montréal. Members of the school also supervise graduate research.

The School of Architecture has set up the Architectural Research Group, to co-ordinate and assist research and consulting activities in the school.

Graduate Courses*

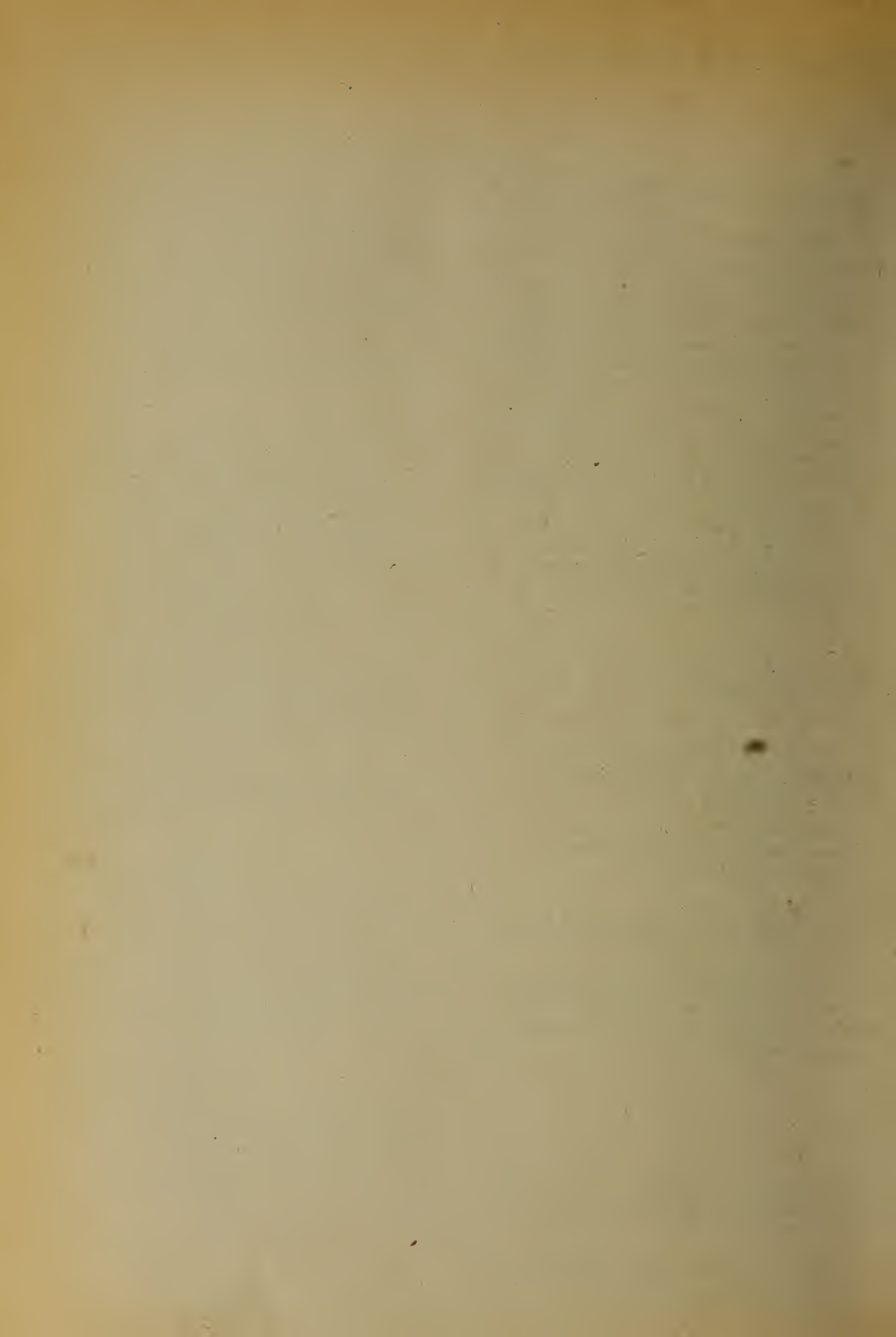
- Architecture 76.500F1, W1
Directed Studies in Canadian Architecture
Reading and research tutorials.
- Architecture 77.500F1, W1
Directed Studies in Building Technology
Reading and research tutorials.
- Architecture 78.500F1, W1
Directed Studies in Urban Planning and Design
Reading and research tutorials.

An Honours degree or equivalent qualification in a relevant field, as well as permission of the school, is a required prerequisite for admission to these courses.

*F,W,S indicates term of offering.

Courses offered in the fall *and* winter (or any other two terms) will be followed by T.

The number following the letter indicates the credit weight of the course: 1 denotes a half-course credit, 2 denotes a full-course credit, etc.



Departmental

Program

Descriptions

and

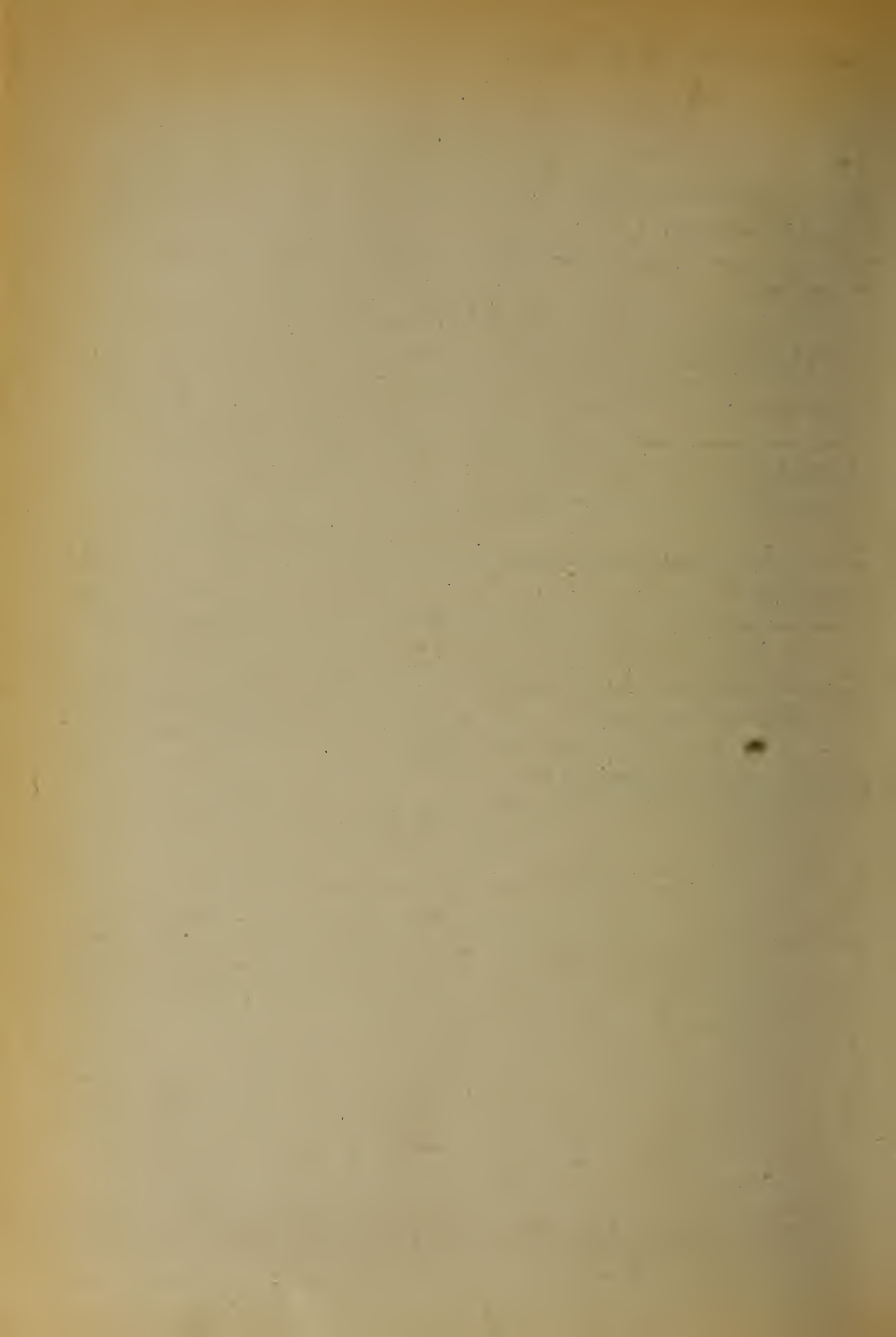
Details

of

Courses

Faculty of Science

Dean: G.B. Skippen



The Department

Chairman of the Department: H.G. Merriam

Associate Chairman, Graduate Studies:

C.A. Barlow

The Department of Biology offers programs of study and research leading to the M.Sc. and Ph.D. degrees. The research activities of faculty members are currently directed to three major areas:

Molecular and Developmental Biology

T.W. Betz, V.N. Iyer, P.E. Lee, M.E. McCully, J.M. Neelin, George Setterfield, K.B. Storey, Hiroshi Yamazaki

Physiology

D.R. Gardner, S.L. Jacobson, K.W. Joy, John Sinclair, J.A. Webb, Frank Wightman

Ecology and Systematics

C.A. Barlow, I.L. Bayly, G.R. Carmody, M.B. Fenton, H.F. Howden, W.I. Illman, J.D.H. Lambert, H.G. Merriam, H.H.J. Nesbitt, S.B. Peck, D.A. Smith

The department welcomes applications from graduates with degrees in the biological sciences. Since current trends indicate that students in the non-biological sciences (chemistry, engineering, mathematics, physics, psychology, etc.) may also be suited to undertake valuable research and graduate work in biology, the department encourages graduates in other scientific disciplines to apply. If admitted, such students may take additional courses in biology to make up deficiencies in their background; the completion of these extra courses will generally not require more than one additional year of study.

Graduate offerings of the Departments of Biology and Chemistry include projects and courses which may be appropriate for students with an interest or background in biochemistry.

The department accepts part-time graduate students but cannot guarantee that they will be able to fulfil all the requirements for their degree outside of normal working hours.

The Department of Biology has co-operative agreements with the National Research Council, the Research Branch of Agriculture Canada, Environment Canada and the National Museum

of Natural Sciences in Ottawa, whereby certain scientists from these institutions may assist graduate students with particular research projects, subject to the approval of the departments concerned.

Each graduate student will be assigned an advisory committee consisting of a supervisor and two advisers. The student's course program and the research program from the planning phase onward will be subject to this committee's approval.

Applications normally must be fully documented by July 31 in order to be considered for registration in the following September.

Qualifying Year Program

Candidates who lack the minimum course qualifications for admission to the Master's program must register in and successfully complete a Qualifying Year program.

Normally, prescribed courses will include 61.498. Refer to the general section of this calendar for details of the regulations governing the Qualifying Year.

Master of Science

Admission Requirements

Applicants will be considered if they hold an Honours B.Sc. degree (or equivalent) with at least high second-class standing and are acceptable to the Graduate Committee of the Department of Biology.

Program Requirements

The candidate will complete at least five approved full courses (or the equivalent), including a research thesis equivalent to a maximum of three full-course credits. Not more than one-half of the formal course requirement may be satisfied by directed special studies or reading courses. The thesis must be defended successfully at an oral examination.

All candidates are also expected to attend and must give at least one departmental research seminar. Candidates may be required to demonstrate a

reading knowledge of one language other than English and to take certain technical or other courses.

Doctor of Philosophy

Admission Requirements

Applicants holding an M.Sc. degree from a recognized university, and who are acceptable to the Graduate Committee of the Department of Biology, will be considered for admission into the Ph.D. program.

An applicant with an Honours bachelor's degree who has achieved an outstanding academic record and, in addition, exhibits very strong motivation and high promise for advanced research, may be admitted to the Ph.D. program directly. Such candidates will be required to complete at least 15 full courses, or the equivalent.

Students admitted to the Master's program who show outstanding academic performance and demonstrate high promise for advanced research during the first year of the Master's program may be permitted to transfer into the Ph.D. program on recommendation by the Graduate Committee of the Department of Biology.

Program Requirements

In order to remain in the Ph.D. program, the candidate must successfully complete the following, or equivalent, over a period of two years or more:

- 10 full courses, or the equivalent
- An oral comprehensive examination, which normally must be undertaken not later than 15 months after initial registration in a Ph.D. program
- A research thesis equivalent to a maximum of eight of the required 10 full course credits which must be defended successfully at an oral examination.

Candidates who fail their oral comprehensive examination may or may not be permitted by the Graduate Committee of the Department of Biology to repeat this examination. A second examination, if permitted, will not differ in format from the first examination and normally must be

passed within three months after the date of the first examination. A grade of unsatisfactory on the second examination will result in dismissal of the candidate from the program.

All candidates are also expected to attend and must give at least one departmental research seminar. Candidates may be required to demonstrate a reading knowledge of one or two languages other than English and to take certain technical or other courses.

Students who have been admitted to the Ph.D. program on the basis of a 15-course requirement, which will normally require three years of full-time study, must complete the following:

- 15 full courses, or the equivalent
- A comprehensive examination
- A research thesis equivalent to a maximum of 10 of the 15-course requirement
- The language requirement outlined above.

Students in either a 10-course or a 15-course Ph.D. program may not satisfy more than one-half of their formal course requirements by directed special studies or reading courses.

Graduate Courses*

- Biology 61.501F1

Topics in Regulation of Microbial Metabolism
A study of mechanisms that regulate microbial metabolism, of genetic and environmental manipulations that increase the efficiency of production of microbial metabolites, and of microbial processes that provide food, energy and other resources.

Prerequisite: A course in cell physiology or biochemistry and permission of the department.

Hiroshi Yamazaki.

*F,W,S indicates term of offering.

Courses offered in the fall *and* winter (or any other two terms) will be followed by T.

The number following the letter indicates the credit weight of the course: 1 denotes a half-course credit, 2 denotes a full-course credit, etc.

- Biology 61.503F1

Biochemical Adaptations of Organisms to the Environment

A lecture and seminar course on the molecular basis of organismal adaptations to environmental factors such as temperature, oxygen availability, pressure, water lack, overwintering and freezing.

Prerequisites: Biochemistry 63.300 or equivalent; permission of the department.

K.B. Storey.

- Biology 61.517T2

Molecular Genetics

Development and use of genetic methods in the solution of problems in molecular biology, including discussion of innovations and current efforts of *in vivo* and *in vitro* genetic engineering. Lectures, seminars, laboratory, essays.

Prerequisites: Graduate standing and permission of the department.

V.N. Iyer.

- Biology 61.524T2

Developmental Cell Biology

A cell-biology course dealing primarily with activities of intact cells; for example, division growth, differentiation, aging, interactions, movements, regulation, etc. Includes lectures, student seminars and either term papers or laboratory projects.

Prerequisites: Graduate standing plus a course in genetics and basic cell biology; permission of the department.

George Setterfield.

- Biology 61.525T2

Plant Physiology and Metabolism

An advanced course dealing with selected topics in plant physiology and plant metabolism. This course may be available to final year Honours undergraduate students with special permission of the department.

Prerequisites: Graduate standing or permission of the department.

K.W. Joy, J.A. Webb and Frank Wightman.

- Biology 61.536T2

Photobiology

A course dealing with the interaction between light and living organisms, including an introduction to photochemistry and a detailed study of photosynthesis, vision, photosensitivity, and photoperiodism.

Prerequisites: An advanced course in animal or plant physiology or biochemistry or permission of the department.

(Offered jointly with the Department of Biology, University of Ottawa).

John Sinclair, J.T. Arnason and Bernard Philogène.

- Biology 61.547T2

Quantitative Ecology

A lecture and laboratory course on concepts and analysis of the distribution and abundance of plants and animals and of related environmental phenomena. Two analytical or critical essays on an ecological topic will be required.

Prerequisites: Graduate standing and courses in elementary ecology and statistics; permission of the department.

C.A. Barlow.

- Biology 61.549T2

Mathematical Modelling for Biologists

This course is designed to develop mathematical tools for the modelling of biological processes. The student is taught the necessary mathematics and Fortran computer language, and guidance is given in the choice and assimilation of a biological process.

L.R. Lefkovitch.

- Biology 61.550T2

Selected Topics

Courses in selected aspects of specialized biological subjects, not covered by other graduate courses, may be offered. Course details will be available at registration.

- Biology 61.551F1

Advanced Topics

Courses in selected aspects of specialized biological subjects, not covered by other graduate courses; course details will be available at registration.

- Biology 61.552W1

Advanced Topics

Courses in selected aspects of specialized biological subjects, not covered by other graduate courses; course details will be available at registration.

- Biology 61.556T2

Advanced Insect/Animal Systematics

Lecture and seminar course concerning methods, rules and advances in systematics of insects and other animals.

Prerequisite: A 400-level course in identification or classification of insects or other animals.

H.F. Howden.

- Biology 61.557T2

Arachnology

An advanced course on phylogeny, systematics, distribution and economic importance of the major arachnids, particularly mites. Research projects will be an integral part of this course and may concern spiders, scorpions, harvestmen, or whip scorpions.

Prerequisite: Biology 61.460 or permission of the department.

H.H.J. Nesbitt, E.E. Lindquist and C.D. Dondale.

- Biology 61.565F1, W1, S1

Field Course

Credit for this half-course is based on a total of three weeks of field course modules involving one or two weeks of intensive and continuous field work with attendant assignments. For details see co-ordinator.

Co-ordinator: M.B. Fenton.

- Biology 61.570T2

Evolution and Biogeography

Prerequisites: Graduate standing and permission of the department.

H.F. Howden.

- Biology 61.575T2

Mammalogy

A lecture, seminar, and laboratory course on the taxonomy, distribution, behaviour and ecology of mammals.

Prerequisites: Biology 61.360 and 61.415, or permission of the department.

D.A. Smith or M.B. Fenton.

- Biology 61.581F1

Animal Behaviour

Half-course in animal behaviour from an ecological and evolutionary point of view as described for 61.481, but with additional assignments appropriate for credit as a graduate course.

Prerequisites: Biology 61.335 and 61.360 or

equivalents and registration in a graduate

program; written permission of the department.
M.B. Fenton.

- Biology 61.590F1, W1, S1

Directed Special Studies and Research

Not more than one full course credit for Biology 61.590 is allowed in a graduate program.

- Biology 61.599F4, W4, S4

M.Sc. Thesis

- Biology 61.600T2

Current Developments in Molecular Genetics

An advanced course on selected topics in molecular genetics offered jointly with the Department of Biology, University of Ottawa.

Prerequisite: Permission of the department.

V.N. Iyer.

- Biology 61.625T2

Advanced Plant Physiology

A seminar course on selected topics in advanced plant physiology and metabolism; available only to graduate students.

Prerequisites: Biology 61.525, or permission of the department.

K.W. Joy, J.A. Webb and Frank Wightman.

- Biology 61.680T2

Advanced Studies in Animal Behaviour

A seminar and laboratory course dealing with current topics in the study of animal behaviour. Students will be expected to present seminars based on the recent literature and to conduct a research project on some aspect of animal behaviour.

Prerequisites: Biology 61.581 or equivalent, or permission of the department.

M.B. Fenton.

- Biology 61.699F, W, S

Ph.D. Thesis

Courses Not Offered in 1981-82

61.510 Advanced Plant Morphogenesis

61.541 Mammalian Reproductive Biology

61.542 Developmental Endocrinology

61.548 Population Biology of Species and Communities

- 61.620 Advanced Cell Biology
- 61.621 Advanced Cell Biology I
- 61.622 Advanced Cell Biology II
- 61.630 Advanced Plant Biochemistry

Department of Chemistry

The Department

Chairman of the Department: D.R. Wiles

Departmental Supervisor of Graduate Studies:

J.S. Wright

The Department of Chemistry offers opportunities for advanced study and research leading to the degrees of M.Sc. and Ph.D. At the Ph.D. level, research is currently focused on the areas of bio-organic chemistry and metal ion chemistry. The department encourages part-time graduate study at the M.Sc. level, particularly for high school teachers and for government and industrial chemists living in the Ottawa area. Admission and program requirements are the same as those for full-time students, although an alternative program may be available incorporating a one-credit thesis for off-campus research.

The current research interests of the Department of Chemistry are:

C.H. Amberg, *Heterogeneous Catalysis and the Surfaces of Non-Metallic Solids*

J.W. ApSimon, *Natural Products Chemistry*

R.G. Barradas, *Electrochemistry and Electro-analytical Chemistry*

G.W. Buchanan, *¹H and ¹³C NMR Spectroscopy*

C.L. Chakrabarti, *Analytical Chemistry and Atomic Spectroscopy*

B.R. Hollebone, *Magnetic Circular Dichroism Spectroscopy, Analytical Toxicology*

J.M. Holmes, *Surface Chemistry*

J.A. Koningstein, *Raman Spectroscopy of the Solid State*

Peeter Kruus, *Structure and Dynamics of Liquids*

P.M. Laughton, *Physical Organic Chemistry*

Michael Parris, *Inorganic Stereochemistry*

R.A. Shigeishi, *Surface Studies of Gas-Metal Systems*

C.S. Tsai, *Mechanisms of Enzyme Reactions*

D.C. Wigfield, *Mechanistic and Biosynthetic Organic Chemistry*

R.H. Wightman, *Synthesis of Oligonucleotides and Pseudo Aromatic Hydrocarbons*

D.R. Wiles, *Inorganic and Analytical Radio-chemistry*

J.S. Wright, *Theoretical Chemistry*

Joint supervision of research projects by the following adjunct professors is possible:

E.J. Casey, *Electrical Power Sources and Biophysics*

O.E. Edwards, *Natural Products and Mechanistic Organic Chemistry*

S.A. Narang, *Nucleic Acid Chemistry*

H.H. Mantsch, *Spectroscopy*

I.E. Puddington, *Colloid Chemistry*

J.J. Sloan, *Infrared Chemiluminescence*

I.C.P. Smith, *NMR Studies of Biologically Important Molecules*

Graduate offerings of the Departments of Biology and Chemistry include projects and courses which may be appropriate for students with an interest or background in biochemistry. Students are encouraged to consult listings of graduate courses offered by the Department of Chemistry at the University of Ottawa.

A joint research and graduate studies institute with the University of Ottawa will come into effect July 1, 1981. Resulting changes in program requirements and course descriptions will be in effect for the 1981-82 academic year; further details should be requested from the Department of Chemistry.

Master of Science

Admission Requirements

The normal requirement for admission to the Master's program is an Honours B.Sc. degree in Chemistry with at least high second-class standing. Candidates who do not qualify for direct admission into the Master's program may be accepted into a Qualifying Year program as specified in the general regulations section of this calendar.

Preparation in the fields of mathematics and physics is also required.

Applicants may in some cases be required to write the Graduate Record Examination before their admission.

Program Requirements

The specific program requirements in the Department of Chemistry are the following:

- Three full courses, or the equivalent
- A research thesis, which must be defended at a final oral examination
- A reading knowledge of *two* languages other than English, normally chosen from French, German, and Russian.

Additional preparatory courses may be recommended if deemed necessary at the time of registration.

Doctor of Philosophy

Admission Requirements

Ordinarily, an M.Sc. degree (or the equivalent) from a recognized university is required for admission to the Ph.D. program. This program consists of the equivalent of 10 full course credits.

An applicant with an Honours B.Sc. degree in Chemistry who has achieved an outstanding academic record and, in addition, exhibits very strong motivation and high promise for advanced research, may be admitted to the Ph.D. program directly. Such candidates will be required to complete the equivalent of at least 15 full courses; thesis weight to be established at the time of admission.

Applicants may be required to write the Graduate Record Examination before their admission. In some cases, preliminary registration in the M.Sc. program may be recommended.

Program Requirements

The normal requirements in the Ph.D. program are the following:

- A minimum of two years of full-time study and research
- Three full courses (or the equivalent) at the graduate level
- A comprehensive examination in chemistry which will be completed approximately one year before submission of the thesis; this will normally take the form of written general examinations in all phases of chemistry, to be taken during the first 15 months of Ph.D. enrolment, and a series of cumulative examinations in the area of specializa-

tion. These examinations are available every month during the fall and winter terms, and the candidate must pass six out of the first 16 papers attempted.

- A Ph.D. thesis equivalent to seven full courses
- A reading knowledge of two languages other than English, normally chosen from French, German and Russian.

Students who have been admitted to the Ph.D. program on the basis of a 15-course requirement must complete the following:

- A minimum of six full courses
- A comprehensive examination in chemistry, as above
- A research thesis equivalent to a maximum of nine full courses
- The language requirement outlined above.

This program will normally require at least three years of full-time study.

Graduate Courses*

- Chemistry 65.515F1

Applications of Group Theory

The applications of group theory to crystal and ligand fields.

Prerequisite: Chemistry 65.310 or equivalent. J.A. Koningstein and B.R. Hollebhone.

- Chemistry 65.519W1

Molecular Reaction Dynamics

Modern experimental and theoretical approaches to the understanding of the microscopic behaviour of colliding molecules. Molecular beams, infrared chemiluminescence, chemical lasers, potential surface and molecular trajectory calculations, with emphasis on chemical reactions.

Prerequisite: Chemistry 65.310 or equivalent. J.S. Wright.

*F, W, S indicates term of offering.

Courses offered in the fall *and* winter (or any other two terms) will be followed by T.

The number following the letter indicates the credit weight of the course: 1 denotes a half-course credit, 2 denotes a full-course credit, etc.

- Chemistry 65.520F1

Surface Chemistry

Studies of chemisorption of gases on metal surfaces; elucidation of the nature of chemisorption bonds and adsorption states, using low energy electron diffraction, field emission microscopy, flash desorption mass spectrometry, reflection I.R. and photoelectron spectroscopy.

Prerequisite: Chemistry 65.310 or equivalent.

R.A. Shigeishi.

- Chemistry 65.525F1

Natural Products Chemistry

A survey of the major classes of natural products, based on biogenetic relationships; emphasis on structural, synthetic and biogenetic aspects.

Prerequisite: Chemistry 65.422, 65.523 or equivalents.

J.W. ApSimon.

- Chemistry 65.527F1

Physical Organic Chemistry

Reaction mechanisms in organic chemistry, linear free energy relationships and methods of approaching transition state structure. Applications of molecular orbital theory to organic chemistry.

Prerequisites: Chemistry 65.410 and 65.420 or equivalents.

D.C. Wigfield.

- Chemistry 65.530W1

Heterocycles and Organic Synthesis

Saturated and unsaturated five and six membered O, N and S heterocycles: structure versus physical and chemical properties; general methods of synthesis; applications of heterocycles as synthetic reagents.

Prerequisite: Chemistry 65.423 or equivalent.

R.H. Wightman.

- Chemistry 65.555W1

Analytical Atomic Spectroscopy

Absorption theory of atomic absorption; methods of measuring atomic absorption; atomization; mechanism of atom formation and dissipation; the flame; the graphite furnace and other resistively heated atomizers; interferences; the Zeeman effect; applications.

Prerequisite: Chemistry 65.431 or permission of the department.

C.L. Chakrabarti.

- Chemistry 65.556F1

Analytical Atomic Spectroscopy

Emission and fluorescence; excitation and de-excitation processes; measurement and calculation of temperature; theoretical and experimental aspects of emission spectroscopy with plasmas, arc and spark; interferences; theoretical and experimental aspects of atomic fluorescence. Interferences.

Prerequisite: Chemistry 65.431 or permission of the department.

C.L. Chakrabarti.

- Chemistry 65.581T2

Seminars in Biological and Organic Chemistry

The course will consist of one-hour seminars not directly related to the student's research problem. There will be an examination covering aspects of other student presentations and those from visiting speakers.

- Chemistry 65.582T2

Seminars in Physical and Inorganic Chemistry

The course will consist of one-hour seminars not directly related to the student's research problem. There will be an examination covering aspects of other student presentations and those from visiting speakers.

- Chemistry 65.590T2

Directed Special Studies

Students may register for this course more than once provided that topics covered are sufficiently different to constitute separate studies.

- Chemistry 65.591F1, W1, S1

Directed Special Studies

- Chemistry 65.599F4, W4, S4

M.Sc. Thesis

- Chemistry 65.699F, W, S

Ph.D. Thesis

Courses Not Offered in 1981-82

65.509 Molecular Spectroscopy

65.516 Quantum Chemistry

65.517 Physical Chemistry of Solutions

65.521 Catalysis

65.522 Electrolyte Theory and Electrode Processes

- 65.523 Electrochemical Technology
- 65.526 Nucleic Acid Chemistry
- 65.528 Non Proton Magnetic Resonance
- 65.531 Biochemistry of Enzyme Action
- 65.532 Mechanisms of Biochemical Reactions
- 65.533 Biosynthesis of Natural Products
- 65.550 Analytical Instrumentation
- 65.559 Chemical Effects of Nuclear
Transformations
- 65.561 Metal Ions in Solution

Department of Geology

The Department

Chairman of the Department: J.A. Donaldson
Departmental Supervisor of Graduate Studies:
D.H. Watkinson

The Department of Geology offers programs of research and study leading to the degrees of Master of Science and Doctor of Philosophy. Currently, the three principal fields of graduate study and research are:

Resource Geology

P.A. Hill, I.R. Jonasson, D.F. Sangster,
W.M. Tupper, D.H. Watkinson, R.W. Yole

Precambrian Geology

Keith Bell, J.A. Donaldson, Edgar Froese,
Edward Irving, J.M. Moore, G.B. Skippen

Structure and Geodynamics

R.L. Brown, Giorgio Ranalli

Current research in the department includes applied geochemistry, mineral deposits, petroleum geology, experimental mineralogy, geochemistry, geochronology, metamorphic and igneous petrology, sedimentology and stratigraphy, structural analysis and geodynamics, crystallography (G.Y. Chao) and palaeontology (Kenneth Hooper and Jarmila Kukalova-Peck).

Qualifying Year Program

Applicants with a general (pass) Bachelor's degree may be admitted to a Qualifying Year program designed to raise their standing to the Honours level. Refer to the general section of this calendar for details of the regulations governing the Qualifying Year.

Master of Science

Admission Requirements

The normal requirement for admission to the Master's program is an Honours bachelor's degree, with at least high second-class standing, in geology or a related discipline.

Program Requirements

M. Sc. by Thesis

- Three full courses at the graduate level in geology or a related discipline
- Informal examination by the candidate's advisory committee to determine whether or not additional non-credit courses should be prescribed
- A thesis based on the student's own research, which must be defended at an oral examination.

M.Sc. by Course Work

- A Master's degree may be obtained by completing five full course credits without presenting a thesis; this option, which requires departmental approval, emphasizes the applied aspects of geology and is primarily intended for students with prior professional experience. Particular emphasis is placed upon mineral resource management and mineral exploration. Up to half of the five credits (which must be completed within three consecutive academic terms in the case of full-time students) may be in subject areas outside geology, such as economics, law, commerce or international affairs.

Doctor of Philosophy

Admission Requirements

The minimum requirements for admission to the Ph.D. program are outlined in the general section of this calendar. The normal requirement is an M.Sc. in Geology or a related discipline.

Students who have been admitted to the Master's program may be permitted to transfer into the Ph.D. program if they show outstanding academic performance and demonstrate significant promise for advanced research during the first year of the Master's program.

Program Requirements

- A minimum of two courses at the graduate level in geology or a related discipline
- Participation in the departmental research seminar
- Informal examination by the candidate's advisory committee to determine whether or not additional non-credit courses should be prescribed
- A reading knowledge of geological subjects in a language other than English; the language

chosen must be relevant to the candidate's field of research. This requirement is to be completed before the end of the second year in the Ph.D.

program, and may be met by completing successfully a formal language course, or by examination within the Department of Geology.

- Comprehensive examination, with emphasis on areas chosen by the advisory committee in consultation with the candidate; the examination will normally be oral and will be undertaken at the end of the first year of study.

- A thesis contributing to basic knowledge in the geological sciences or related fields, which must be defended successfully at an oral examination.

Selection of Courses

Although as a general rule only graduate courses can be credited towards a graduate degree, Master's candidates may, with the permission of the department, take up to one full course or its equivalent at the senior undergraduate level.

In addition to the courses offered by the department, graduate students in geology may select, in partial fulfilment of their degree requirements, certain courses offered by other departments of the University, if suitable to their program.

Through inter-university co-operation in graduate instruction, full-time graduate students registered at Carleton may arrange to enrol in up to four of the following half-courses at the University of Ottawa:

- Geo 5310, 5311 Palaeontology I and II
- Geo 5320, 5321 Mineralogy I and II
- Geo 5330 Structural Geology
- Geo 5331 Tectonics
- Geo 5342 Chemical Phase Theory
- Geo 5343 Igneous and Metamorphic Petrology
- Geo 5350 Historical Geochemistry
- Geo 5351 Sedimentary Geochemistry
- Geo 5360, 5361 Sedimentology I and II
- Geo 5370, 5371 Mineral Deposits I and II
- Geo 5390 Precambrian Geology

Graduate Courses*

- Geology 67.504F1, W1, S1

Field Studies

Systematic investigations of geological problems, based on a minimum of 15 days field work plus related library research and laboratory projects. Written report required.

J.A. Donaldson and other members of the department.

- Geology 67.514F1

Tectonophysics

The basic concepts of continuum mechanics applied to geodynamic problems: stress, strain, rheological equations, theories of elasticity, strength, plasticity, and linear and nonlinear viscosity. Lectures and seminars on fundamentals and selected case histories.

Prerequisite: Graduate standing in geology or a related discipline, or permission of the instructor. Giorgio Ranalli.

- Geology 67.520T2

Mineral Deposits

Theories of genesis of ore deposits are examined in light of their field relationships, consideration of element and isotope distribution and phase equilibria. Specific examples are chosen to illustrate the features of deposits of different genetic types.

Prerequisite: Geology 67.421.

D.H. Watkinson.

- Geology 67.525T2

Advanced Crystallography

Principles and techniques of X-ray crystallography; interpretation of X-ray photographs and application to the study of minerals.

Prerequisites: Geology 67.221 and 67.222.

G.Y. Chao.

*F, W, S indicates term of offering.

Courses offered in the fall *and* winter (or any other two terms) will be followed by T.

The number following the letter indicates the credit weight of the course: 1 denotes a half-course credit, 2 denotes a full-course credit, etc.

- Geology 67.531F1

Advanced Palaeontology I

The morphology, classification, palaeoecology and geological history of one or more faunal or floral fossil groups. Normally the course stresses microfauna and microflora, such as *Foraminifera*, *Ostracoda*, conodonts, spores, pollen and acritarchs, but arthropods (especially insects) and other macrofossils may also be included.

Prerequisites: Geology 67.431 may be taken concurrently; Biology 61.360 is recommended. Kenneth Hooper and Jarmila Kukalova-Peck.

- Geology 67.532W1

Advanced Palaeontology II

A consideration of fossil groups not covered in 67.531.

Prerequisites: Geology 67.431 may be taken concurrently; Biology 61.360 is recommended. Kenneth Hooper and Jarmila Kukalova-Peck.

- Geology 67.540F1

Tectonics Seminar

Critical appraisal of current global tectonic theories in the light of data from structure, geodynamics, petrology, geochemistry, sedimentology and palaeontology.

Prerequisite: Graduate standing in the Department of Geology.

- Geology 67.542W1

Advanced Structural Geology

A study of the structural evolution of mountain belts, with emphasis on field methods. Lectures, seminars, laboratory studies, research project.

Prerequisites: Geology 67.385 or permission of the department.

- Geology 67.552W1

Advanced Igneous Petrology

Solid-liquid phase equilibria applied to igneous rocks. Fractional melting and crystallization, assimilation, liquid immiscibility, volatile species. Chemistry of igneous rock series; tectonic setting of igneous activity.

Prerequisite: Geology 65.451.

J.M. Moore and others.

- Geology 67.560T2

Stratigraphy and Sedimentology

Selected problems in sedimentary geology. The application of modern techniques of stratigraphic, petrologic and statistical analysis.

Prerequisites: Geology 67.325, 67.335, 67.463. R.W. Yole and J.A. Donaldson.

- Geology 67.563W1

Precambrian Geology II

Review and discussion of recent literature of Precambrian geology. Comparative study of the Canadian Shield and other Precambrian shields.

Prerequisite: Geology 67.562 or permission of the department.

J.A. Donaldson.

- Geology 67.582W1

Isotope Geology

Application of isotopes to geologic problems.

Review of the basic methods. Case histories. Age of the earth and meteorites. "Absolute" time scale. Stable isotopes: carbon, oxygen, sulphur. Fission track dating.

Prerequisite: Geology 67.325 or permission of the instructor.

Keith Bell.

- Geology 67.585T2

Physical Geochemistry

Application of thermodynamics to geologic problems. Experimental study of mineral equilibria.

Prerequisites: Chemistry 65.210, Geology 67.451.

G.B. Skippen.

- Geology 67.590T2, 67.591F1, W1

Directed Studies

Directed reading or directed laboratory studies for full or half-course credit, under the guidance of selected extramural or intramural directors.

- Geology 67.599F4, W4, S4

M.Sc. Thesis

- Geology 67.699F16, W16, S16

Ph.D. Thesis

Courses Not Offered in 1981-82

67.505 Mineral Economics

67.523 The Fossil Fuels

67.534 Palynology and Microplankton

67.551 Advanced Metamorphic Petrology

67.553 Physical Volcanology

- 67.562 Precambrian Geology I
- 67.580 Advanced Inorganic Geochemistry
- 67.583 Physics of the Earth
- 67.585 Physical Geochemistry

Information and Systems Science Committee

The Committee

Chairman of the Committee: C.M. Woodside

With the co-operation of the Department of Mathematics and Statistics and the Department of Systems and Computer Engineering, the committee offers programs of graduate study and research leading to the degree of Master of Science.

Within the program, four areas of specialization exist:

- Information Systems Engineering
- Numerical and Non-Numerical Applications of Computers
- Computing Science
- Mathematical Systems Theory and Applications

Combining elements from the disciplines of mathematics, statistics, systems engineering, computing science, and electrical engineering, the program is oriented towards the high-level theorist/practitioner who is called upon to examine systems-related problems, frequently of an interdisciplinary nature. Topics spanned by the four areas above include computer network design, mini/micro computer systems, database systems, software development, theory of algorithms, dynamical systems, statistics and operations research. Close links are maintained with the scientific, industrial, and technological communities, and an effort is made to direct students to project work of current practical significance.

Qualifying Year Program

Applicants who have a general (pass) Bachelor's degree, or who otherwise lack the required undergraduate preparation, may be admitted to a Qualifying Year program. Refer to the general section of this calendar for regulations governing the Qualifying Year.

Master of Science

Admission Requirements

Applicants should have an Honours bachelor's degree, or equivalent, with at least high second-class standing, in mathematics, engineering, physics, chemistry, computing science, operations research, experimental psychology, econometrics, management science, or a related discipline. Undergraduate preparation should include at least two full courses in computing and a minimum of three full courses in mathematics, at least one of which is at the third-year level or higher. In addition, the student is required to have some knowledge of quantitative applications, such as numerical analysis, simulation, operations research, etc. *

Admissions to the program will be made through one of the two participating departments. Since space and laboratory facilities will be provided by one of the departments, students should apply through the department with which they wish to be most closely associated.

Program Requirements

The normal program comprises eight half-courses and a thesis having a weight of one and a half full courses; additional requirements may also be stipulated, depending upon the individual student's background. With the approval of the committee, students who have substantial work experience may be permitted to substitute three additional half-courses in place of the thesis, one of which must be a graduate project course.

Students must take at least one full course from each of the two participating departments as well as the joint course 70/94.582: Topics in Information Science. Each student should consult with his faculty adviser in the selection of a course pattern related to his principal area of interest.

Each candidate submitting a thesis will be required to undertake an oral examination on the subject of his thesis.

Course work may be completed on either a full-time or part-time basis. Thesis research normally requires full-time residence at the University. However, a candidate may be permitted to carry

out thesis work off campus provided that suitable arrangements are made for supervision and experimental work, and prior approval is given by the committee.

Graduate Courses*

- Information and Systems Science 70/94.582WI
Topics in Information and Systems Science
The purpose of this course is to bring together fundamental results in the new and active area of design and analysis of efficient computer algorithms for large, complex problems. Areas of application include data manipulation, computer networks, queueing systems, and optimization.

- Information and Systems Science 70/94.598F3, W3, S3
Master's Thesis in Information and Systems Science

Mathematics and Statistics

Undergraduate Courses:

- 70.301 Real Analysis I
- 70.302 Real Analysis II
- 70.310 Modern Algebra
- 70.350 Mathematical Statistics
- 70.403 Functional Analysis
- 70.451 Probability Theory
- 70.452 Sampling Theory and Methods I
- 70.453 Regression Analysis
- 70.456 Non-Parametric Methods I
- 70.457 Testing of Hypotheses
- 70.458 Stochastic Models
- 70.470 Partial Differential Equations
- 70.471 Partial Differential Equations
- 70.473 Qualitative Theory of Ordinary Differential Equations
- 70.482 Introduction to Mathematical Logic
- 70.483 Topics in Applied Logic
- 70.484 Design and Analysis of Algorithms
- 70.485 Theory of Automata

*F,W,S indicates term of offering.

Courses offered in the fall *and* winter (or any other two terms) will be followed by T.

The number following the letter indicates the credit weight of the course: 1 denotes a half-course credit, 2 denotes a full-course credit, etc.

- 70.486 Numerical Analysis
- 70.487 Game Theory
- 70.496 Directed Studies

Graduate Courses:

- 70.500 Analysis
- 70.510 General Algebra
- 70.552 Sampling Theory and Methods II
- 70.553 Analysis of Variance I
- 70.554 Stochastic Processes and Time Series Analysis
- 70.555 Design of Experiments
- 70.556 Non-Parametric Methods II
- 70.557 Statistical Inference
- 70.558 Topics in Stochastic Processes
- 70.559 Multivariate Analysis
- 70.561 Statistical Methods in Operations Research
- 70.565 Theory of Automata
- 70.567 Game Theory
- 70.569 Topics in Combinatorial Mathematics
- 70.570 Probability Theory
- 70.581 Linear Optimization
- 70.583 Nonlinear Optimization
- 70.584 Topics in Operations Research
- 70.585 Topics in Algorithm Design
- 70.586 Numerical Analysis
- 70.587 Formal Languages and Syntax Analysis
- 70.588 Combinatorial Optimization
- 70.589 Combinatorial Optimization
- 70.590 Seminar in Mathematics
- 70.591 Directed Studies
- 70.593 Information and Systems Science Project
- 70.652 Advanced Design of Surveys

Systems and Computer Engineering

Undergraduate courses:

- 94.303 Real-Time Computing Systems
- 94.367 Switching Circuits
- 95.401 Operating Systems
- 94.405 Discrete Simulation and its Applications
- 94.451 Communication Systems
- 94.456 Automatic Control Systems II
- 94.457 Introduction to the Architecture of Computer Systems
- 94.461 Microprocessor Systems
- 94.480 Introduction to Software Engineering
- 94.481 Software Engineering Project

Graduate Courses:

- 94.501 Simulation and Modelling

- 94.504 Computer Methods in Industrial Engineering
- 94.505 Optimization Theory and Methods
- 94.510 Measurements and Models for Computer Systems and Workloads
- 94.517 Queueing, Scheduling and Control of Information Systems
- 94.518 Topics in Information Systems
- 94.521 Computer Communication Systems
- 94.527 Distributed Processing Systems
- 94.531 Software Engineering
- 94.532 Digital System Engineering
- 94.533 Computer System Engineering
- 94.534 Mini/Micro Applications
- 94.551 Estimation and Detection
- 94.552 Advanced Linear Systems
- 94.553 Stochastic Processes
- 94.554 Data Communications I
- 94.557 Fundamentals of Discrete Systems
- 94.558 Digital Systems Architecture
- 94.562 Digital Signal Processing
- 94.565 Data Communications II
- 94.567 Source Coding and Data Compression
- 94.571 Mini/Microcomputer Operating Systems
- 94.572 Programming Workshop
- 94.573 Integrated Database Systems
- 94.574 Elements of Computer Systems
- 94.575 Software Translators and Their Applications
- 94.576 Analytical Performance Models of Computer Systems
- 94.577 Teleprocessing Software Design
- 94.596 Directed Studies

Because of the interdisciplinary nature of this area, a student will in some cases benefit by taking a third-year course as part of his program. In such cases it will be extra to the formal degree requirements, or else arrangements will be made to ensure that the subject matter is enriched through extra reading, etc.

The Department

Chairman of the Department: K.S. Williams
Departmental Supervisor of Graduate Studies:
 C.W.L. Garner

The Department of Mathematics and Statistics offers graduate programs leading to the M.Sc. degree, with specialization in pure mathematics, applied mathematics, probability and statistics, and, in co-operation with the Department of Systems and Computer Engineering, a program leading to the M.Sc. degree in Information and Systems Science; for details regarding this program, see page 124.

The Ph.D. degree is offered with specialization in pure mathematics, applied mathematics and probability and statistics.

The Department of Mathematics and Statistics also offers a co-operative Master's program in statistics in collaboration with the federal government, emphasizing practical training through work experience along with sound training in statistical inference and basic probability theory.

The principal research interests of the faculty include the following fields:

Pure Mathematics

Algebra: group theory; theory of rings and modules; representation theory; universal algebra; ordered structures; homological algebra; categories; commutative algebra

Analysis: inequalities; summability; generalized integral transform; functional analysis; function spaces and algebras; operator theory; measure theory; potential theory

Geometry: non-Euclidean, projective and finite geometries; regular figures

Number theory: asymptotic theory; finite fields; analytic number theory

Topology: structures of continuous functions; categorical topology; fixed point theory; algebraic topology

Applied Mathematics

Compressible fluids; shock waves; aerofoil theory; diffusion and convection; magnetohydrodynamics; electromagnetic and diffraction theory; special functions; asymptotic expansions; kinetic theory of gases; upper atmosphere problems;

dynamics of stellar systems; numerical analysis; mathematical foundations of computing science and operations research

Probability and Statistics

Probability theory; stochastic processes; weak and strong laws of invariance principle; goodness of fit; characterizations; multivariate analysis; operations research; distribution theory; analysis of variance; estimation theory; non-parametric methods; experimental design; sampling theory; foundations of statistical inference

Master of Science

Admission Requirements

The minimum requirements for admission to the Master's program are outlined in the general section of this calendar. Applicants with a general (pass) Bachelor's degree may be admitted to a Qualifying Year program.

In addition, applicants may be required to write the Advanced Tests in Mathematics of the Graduate Record Examination.

Program Requirements

The two program options in mathematics are the following:

- Four full courses and a thesis
- Five full courses, without a thesis.

Only two of 70.507, 70.516, 70.518, 70.526, 70.527, 70.528, 70.535, 70.536, 70.546, 70.547, 70.551, 70.565, 70.567, and 70.571 may be offered in fulfilment of the degree requirements. In addition, one course may be selected from those offered at the senior undergraduate (400) level.

At least one of the courses must be taken in a field other than the student's major field. Ordinarily, this course should be at the 500 level, but in certain cases this rule may be waived by the chairman of the committee on graduate studies.

If a thesis is written, the candidate will be required to undertake an oral examination on the subject of his thesis.

Students who plan to specialize in probability and statistics are strongly advised that during their Master's program they include, where possible, the half-courses 70.450, 70.551 in mathe-

mathematical statistics; 70.452, 70.555 in applied statistics, and 70.451, 70.571 in probability, together with the equivalent of a further full course in the Department of Mathematics and Statistics. In addition, a graduate course in another field such as biology, biostatistics, economics, computing science, system analysis, and stochastic modelling, is highly recommended.

Doctor of Philosophy

Admission Requirements

The minimum requirements for admission to the Ph.D. program are outlined in the general section of this calendar.

Program Requirements

The course requirement is a minimum of three graduate courses and a suitable thesis. At least one of the courses must be chosen from those offered outside the candidate's major field.

Language requirements will be determined by the candidate's thesis advisory committee.

A comprehensive examination will be undertaken in the following areas:

- The candidate's general area of specialization at the Ph.D. level
- A basic examination on two topics chosen from algebra, analysis, probability, and topology. (This choice excludes the student's specialty.)

The format of the comprehensive examination will be determined by the candidate's advisory committee, but will normally consist of three written sections. This examination must be completed successfully within 18 months of admission into the Ph.D. program in the case of a full-time student, and within 36 months of admission in the case of a part-time student.

All Ph.D. candidates are also required to undertake a final oral examination on the subject of their thesis.

Selection of Courses

The following undergraduate courses may, with the approval of the Department of Mathematics and Statistics, be selected by Master's candidates in partial fulfilment of their degree requirements:

Mathematics and Statistics

- 70.401 Vector Calculus
- 70.403 Functional Analysis
- 70.407 Measure Theory
- 70.415 Rings and Modules
- 70.416 Group Theory
- 70.417 Commutative Algebra
- 70.418 Homological Algebra and Category Theory
- 70.425 Introduction to General Topology
- 70.426 Introduction to Algebraic Topology
- 70.427 Foundations of Geometry
- 70.428 Introduction to Differentiable Manifolds
- 70.435 Analytic Number Theory
- 70.436 Algebraic Number Theory
- 70.445 Analytical Dynamics
- 70.446 Hydrodynamics and Elasticity
- 70.447 Tensor Analysis and Relativity Theory
- 70.450 Parametric Estimation
- 70.451 Probability Theory
- 70.452 Sampling: Theory and Methods I
- 70.453 Regression Analysis
- 70.456 Non-Parametric Methods
- 70.457 Testing of Hypotheses
- 70.458 Stochastic Models
- 70.459 Statistical Methods in Operations Research
- 70.470 Partial Differential Equations I
- 70.471 Partial Differential Equations II
- 70.472 Integral Transforms
- 70.473 Qualitative Theory of Ordinary Differential Equations
- 70.482 Introduction to Mathematical Logic
- 70.483 Topics in Applied Logic
- 70.484 Design and Analysis of Algorithms
- 70.485 Theory of Automata
- 70.486 Numerical Analysis
- 70.487 Game Theory

Graduate Courses*

- Mathematics 70.500T2

Analysis

Set theory, metric and topological spaces, linear spaces and functional analysis, distributions, operators, introductory spectral theory, measure and integral.

Prerequisites: Mathematics 70.301 and 70.302, familiarity with metric spaces and general mathematical ideas at fourth-year level.
Vlastimil Dlab, W.J. Schneider and L.E. May.

- Mathematics 70.501W1

Abstract Measure Theory

Abstract measure and integral, L-spaces, complex measures, product measures, differentiation theory, Fourier transforms.

Prerequisite: Mathematics 70.407.
J.N. Pandey.

- Mathematics 70.502F1

Distributions and Generalized Functions

Linear topological spaces, countably multinormed spaces, countable union spaces and their duals, testing function spaces, spaces of generalized functions and their structure, Schwartz distributions, calculus of distribution, convolution, analytic representation and Fourier transform of distributions.

Prerequisite: Mathematics 70.403.
J.N. Pandey.

- Mathematics 70.503F1

Banach Algebras

Commutative Banach algebras; the space of maximal ideals; representation of Banach algebras as function algebras and as operator algebras; the spectrum of an element; special types of Banach algebras, for example, regular algebras, algebras with involution; applications.

Graham Zelmer.

- Mathematics 70.504W1

Integral Equations

A survey of the main results in the theory of non-singular linear integral equations; Volterra and Fredholm equations of first and second kind in the L_2 case, with special results for the continuous case; Hermitian kernels; eigen-function expansions; compact operators.

Prerequisites: Mathematics 70.302 and 70.403.
P.R. Beesack.

- Mathematics 70.505F1

Complex Analysis

Complex differentiation and integration, harmonic functions, maximum modulus principle, Runge's theorem, conformal mapping, entire and meromorphic functions, analytic continuation.
Arthur Smith.

- Mathematics 70.507F1

Measure Theory

Measure theory and integration of real-valued functions.

Prerequisite: Mathematics 70.302 or permission of the department.
L.E. May.

- Mathematics 70.509F1

Introduction to Hilbert Space

Geometry of Hilbert Space, spectral theory of linear operators in Hilbert Space.

Prerequisites: Mathematics 70.301, 70.302 and 70.403.
J.N. Pandey.

- Mathematics 70.510T2, S2

General Algebra

Algebraic structures, universal algebras, lattices, direct decompositions, operator groups and rings, algebraic constructions, ordered groups and rings, normed algebras, topological groups and rings.
Maurice Chacron.

- Mathematics 70.511T2

Theory of Groups

Abelian groups, solvable and nilpotent groups, free groups and free products, structure of finite groups, linear groups, simple groups.

J.D. Dixon and J.C. Poland.

- Mathematics 70.512T2

Group Representations and Applications

An introduction to group representations and

*F,W,S indicates term of offering.

Courses offered in the fall *and* winter (or any other two terms) will be followed by T.

The number following the letter indicates the credit weight of the course: 1 denotes a half-course credit, 2 denotes a full-course credit, etc.

character theory, with selected applications.
B.M. Puttaswamaiah.

- Mathematics 70.513T2

Rings and Modules

Generalizations of the Wedderburn-Artin theorem and applications, homological algebra.

Maurice Chacron, Vlastimil Dlab, and
B.M. Puttaswamaiah.

- Mathematics 70.515T2

Topological Groups

General topological groups, subgroups and factor groups, local properties. Haar integral, Lie groups.
M.J. Moore and Luis Ribes.

- Mathematics 70.516W1

Group Theory

Fundamental principles as applied to abelian, nilpotent, solvable, free, and finite groups; representations.

Prerequisite: Mathematics 70.310 or permission of the department.

Luis Ribes.

- Mathematics 70.518W1

Homological Algebra and Category Theory

Axioms of set theory, categories, functors, natural transformations; free, projective, injective and flat modules; tensor products and homology functors, derived functors; dimension theory.

Prerequisite: Mathematics 70.310 or permission of the department.

I.S. Pressman.

- Mathematics 70.520T2

Topology

General topology, homotopy theory, the fundamental group, complexes, differentiable manifolds, homology theory.

Prerequisites: Mathematics 70.301, 70.302, 70.310.
M.J. Moore, L.D. Nel and I.S. Pressman.

- Mathematics 70.521T2

Topics in Foundations of Geometry

Various axiom systems of geometry. Detailed examinations of at least one modern approach to foundations, with emphasis upon the connections with group theory.

Prerequisite: Permission of the department.

C.W.L. Garner.

- Mathematics 70.522F1

Homology Theory

The Eilenberg-Steenrod axioms and their consequences, singular homology theory, applications to topology and algebra.

Prerequisite: Mathematics 70.425.

H.H. Schirmer and I.S. Pressman.

- Mathematics 70.526W1

Introduction to Algebraic Topology

Two-dimensional manifolds, homotopy, the fundamental group, covering spaces, CW-complexes.

Prerequisite: Mathematics 70.310 and 70.425 or permission of the department.

Kenneth Hardy.

- Mathematics 70.527F1

Foundations of Geometry

A study of at least one modern axiom system of Euclidean and non-Euclidean geometry, embedding of hyperbolic and Euclidean geometries in the projective plane, groups of motions, models of non-Euclidean geometry.

Prerequisite: Mathematics 70.310 (may be taken concurrently) or permission of the department.

C.W.L. Garner and Brian Mortimer.

- Mathematics 70.528F1

Introduction to Differentiable Manifolds

A study of differentiable manifolds from the point of view of either differential topology or differential geometry. Topics such as smooth mappings, transversality, intersection theory, vector fields on manifolds, Gaussian curvature, Riemannian manifolds, differential forms, tensors and connections are included.

Prerequisite: Mathematics 70.301 or permission of the department.

H.H. Schirmer.

- Mathematics 70.530T2

Methods of Number Theory

Introduction to the Hardy-Littlewood method, sieve methods of Brun and Selberg, character sums.

Prerequisite: Mathematics 70.435.

K.S. Williams.

- Mathematics 70.532T2

Algebraic Number Theory

Valuations, local fields, algebraic number fields, class number, unit theorem, extension of number fields, ramification theory, quadratic and cyclotomic fields.

Prerequisite: Mathematics 70.436.

K.S. Williams.

- Mathematics 70.535F1

Analytic Number Theory

Dirichlet series, characters, Zeta-functions, prime number theorem, Dirichlet's theorem on primes in arithmetic progressions, binary quadratic forms.

Prerequisite: Mathematics 70.307 or permission of the department.

K.S. Williams.

- Mathematics 70.536W1

Algebraic Number Theory

Algebraic number fields, bases, algebraic integers, integral bases, arithmetic in algebraic number fields, ideal theory, class number.

Prerequisite: Mathematics 70.310 or permission of the department.

K.S. Williams.

- Mathematics 70.540T2

Advanced Classical Mechanics

Hamiltonian dynamics; integral invariants; non-holonomic systems; rigid body motions.

Prerequisite: Mathematics 70.345 or permission of the department.

Mizanur Rahman.

- Mathematics 70.541F1

Advanced Methods of Applied Mathematics I: Calculus of Variations

Extreme values of functionals; necessary conditions for an extremum. Sufficient conditions for an extremum. Hamilton-Jacobi Theory and the Maximum Principle of Pontryagin. The problem of Lagrange: the Isoperimetric problem.

Prerequisite: Mathematics 70.345 or permission of the department.

D.W. Sida.

- Mathematics 70.542W1

Advanced Methods of Applied Mathematics II: Special Functions and Asymptotic Methods

Hypergeometric and Generalized Hypergeometric

functions; classical orthogonal polynomials in discrete and continuous variables. Confluent Hypergeometric and Bessel functions. Asymptotic expansions; steepest descent, WKB approximation and other asymptotic methods.

Prerequisite: Mathematics 70.307 and 70.308 or permission of the department.

Mizanur Rahman.

- Mathematics 70.543F1

Theory of Subsonic Flows

Integral formulation of the basic equations of gas dynamics. Boundary conditions for moving surfaces, including surfaces of discontinuity. Regular and singular perturbation problems, with applications to aerofoil theory and viscous flow theory. Linearized subsonic theory, with applications to flows about wings and slender bodies. Hodograph methods and higher order theories of compressible subsonic flow.

Prerequisite: Mathematics 70.446 or permission of the department.

(Also offered as Engineering 88.506)

E.J. Norminton.

- Mathematics 70.544W1

Theory of Supersonic Flows

The theory of characteristics derived by matrix methods. Applications to one-dimensional unsteady and two-dimensional steady supersonic flows. Wave propagation in shock tubes. Rarefaction and compression waves. Riemann invariants and wave interaction problems. Structure of a shock front. Supersonic sources with applications to wings and bodies. Supersonic flow about oscillating aerofoils.

Prerequisite: Mathematics 70.446 or permission of the department.

(Also offered as Engineering 88.507)

Paul Mandl.

- Mathematics 70.546F1

Introduction to Partial Differential Equations

First order linear, quasi-linear, and nonlinear equations; second order equations in two or more variables; systems of equations; the wave equation; Laplace and Poisson's equations; Dirichlet and Neumann problems; Green's functions.

Prerequisite: Mathematics 70.302 or 70.307, and 70.308, or permission of the department.

J.N. Pandey.

- Mathematics 70.547W1

Topics in Partial Differential Equations

Theory of distributions, initial-value problems based on two-dimensional wave equations, Laplace transform, Fourier integral transform, diffusion problems, Helmholtz equation with application to boundary and initial-value problems in cylindrical and spherical co-ordinates.

Prerequisite: Mathematics 70.546 or permission of the department.

J.N. Pandey.

- Mathematics 70.550F1

Multivariate Normal Theory

Multivariate normal distribution-properties, characterization, estimation of means and covariance matrix. Regression approach to distribution theory of statistics; multivariate tests; correlations; classification of observations; Wilks' criteria.

Prerequisite: Mathematics 70.350.

D.K. Dale and Ehsanes Saleh.

- Mathematics 70.551W1

Testing of Hypotheses

Confidence interval, fiducial interval, Bayesian interval, most powerful test, uniformly most powerful test, power function, minimal sufficiency, complete statistic, similar regions, unbiased test, likelihood ratio test.

Prerequisite: Mathematics 70.450 or permission of the department.

A.B.M.L. Kabir.

- Mathematics 70.552W1

Sampling Theory and Methods II

Ratio and regression estimation theory; unequal probability sampling; multi-stage sample designs; two-phase sampling; interpenetrating samples; domains of study; nonsampling errors; related topics.

Prerequisite: Mathematics 70.452 or permission of the department.

J.N.K. Rao.

- Mathematics 70.553F1

Analysis of Variance I

The basic mathematical theory of the analysis of variance; mathematical models; estimable functions; Gauss-Markov theorems; confidence ellipsoids; tests of hypotheses; the one-way and some higher-way layouts; analysis of covariance.

Prerequisite: Mathematics 70.450 or permission of the department.

A.B.M.L. Kabir.

- Mathematics 70.554F1

Stochastic Processes and Time Series Analysis

Stationary stochastic processes, inference for stochastic processes, applications to time series and spatial series analysis.

Prerequisites: Mathematics 70.451 or permission of the department.

D.A. Dawson.

- Mathematics 70.555W1

Design of Experiments

Interpretation of factorial experiment; confounding; fractional replication; split plot, split block, Latin square, Graeco-Latin square, lattice and incomplete block designs; response surface techniques.

Prerequisite: Mathematics 70.453 or permission of the department.

J.N.K. Rao.

- Mathematics 70.556W1

Robust Statistical Inference

Nonparametric tests for location, scale and regression parameters. Derivation of rank tests. Distribution theory of linear rank statistics and their efficiency. Robust estimation of location, scale and regression parameters; Huber's M-estimators, Rank-method, L-estimators. Influence function. Adaptive procedures.

Prerequisite: Mathematics 70.456 or permission of the department.

Miklos Csörgö and Ehsanes Saleh.

- Mathematics 70.557W1

Statistical Inference

Pure significance tests; uniformly (or locally) most powerful tests; likelihood ratio tests; tests of fit; asymptotic comparisons of tests; likelihood, Bayesian and empirical Bayesian methods; fiducial and structural arguments.

Prerequisite: Mathematics 70.450 or permission of the department.

J.N.K. Rao and Peter Tan.

- Mathematics 70.558F1

Topics in Stochastic Processes

Course contents will vary, but will include topics drawn from Markov processes. Brownian motion stochastic differential equations, martingales, Markov random fields, random measures and infinite particle systems, advanced topics in modelling; population models, etc.

Prerequisite: Mathematics 70.356 and 70.451 or permission of the department.

Miklos Csörgö.

- Mathematics 70.559F1

Multivariate Analysis

Multivariate methods of data analysis, including principal components, cluster analysis, factor analysis, canonical correlation, MANOVA, profile analysis, discriminant analysis, path analysis. *Prerequisite:* Mathematics 70.450 or permission of the department.

J.E. Graham.

- Mathematics 70.561F1

Statistical Methods in Operations Research

Dynamic programming; modelling of physical systems by Markov chains; sequential inference problems; adaptive control processes; the principle of optimality; dynamic programming under uncertainty.

Prerequisites: Mathematics 70.356 and 70.451 or permission of the department.

Roger Fischler.

- Mathematics 70.565F1

Theory of Automata

Algebraic structure of sequential machines, decomposition of machines; finite automata, formal languages; complexity.

Prerequisite: Mathematics 70.210 or permission of the department.

Vlastimil Dlab.

- Mathematics 70.567F1

Game Theory

Two-person zero-sum games; infinite games; multi-stage games; differential games; utility theory; two-person general-sum games; bargaining problem; n-person games; games with a continuum of players.

Prerequisite: Mathematics 70.301 or permission of the department.

Peter Tan.

- Mathematics 70.569F1

Topics in Combinatorial Mathematics

Prerequisite: Permission of the department.

- Mathematics 70.570T2

Probability Theory

Axioms, expectation and integration; zero-one law; Borel-Cantelli lemma; Kolmogorov's extension theorem; convergence concepts, laws of large numbers, characteristic functions; weak convergence; invariance principle, Brownian motion; Markov chains, conditional expectation, martingales.

Prerequisites: Mathematics 70.301, 70.302, 70.407.

Miklos Csörgö and D.A. Dawson.

- Mathematics 70.571W1

Stochastic Models

Markov chains, fields and processes. Analytical methods, simulation and approximation methods, inference and decision problems. Stochastic models arising in the physical, biological, social information, management, and systems sciences.

Prerequisites: Mathematics 70.350 and 70.356 or permission of the department.

D.A. Dawson.

- Mathematics 70.581F1

Linear Optimization

Linear programming problems; simplex method, upper bounded variables, free variables; duality; postoptimality analysis; linear programs having special structures; integer programming problems; unimodularity; knapsack problem.

Prerequisite: A course in linear algebra and permission of the department.

Frantisek Fiala.

- Mathematics 70.582W1

Topics in Information and Systems Science

The purpose of this course is to bring together fundamental results in the new and active area of design and analysis of efficient computer algorithms for large, complex problems. Areas of application include data manipulation, computer networks, analysis, queueing systems, optimization, etc.

(Also offered as Engineering 94.582)

R.J.A. Buhr and Frantisek Fiala.

- Mathematics 70.583W1

Nonlinear Optimization

Methods for unconstrained and constrained optimization problems; Kuhn-Tucker conditions; penalty functions, duality; quadratic programming; geometric programming; separable programming; integer nonlinear programming; pseudo-Boolean programming; dynamic programming.

Prerequisite: Permission of the department.

W.H. Cunningham.

- Mathematics 70.584F1, W1, S1

Topics in Operations Research

- Mathematics 70.585F1, W1, S1

Topics in Algorithm Design

- Mathematics 70.586F1

Numerical Analysis

Error analysis for fixed and floating point arithmetic; systems of linear equations; eigen-value problems; sparse matrices; interpolation and approximation, including Fourier approximation; numerical solution of ordinary and partial differential equations.

Prerequisite: Permission of the department.

L.E. May.

- Mathematics 70.587F1

Formal Language and Syntax Analysis

Context-free languages; ambiguity; the parsing problem; parallel top-down and bottom-up methods; backtrack and n-backtrack methods and suitable languages; LR (k), bounded-context and precedence grammars, relation to automata.

Prerequisite: Mathematics 70.485 desirable; permission of the department.

Frantisek Fiala.

- Mathematics 70.588W1

Combinatorial Optimization

Network flow theory and related material.

Topics will include shortest paths, minimum spanning trees, maximum flows, minimum cost flows. Optimal matching in bipartite graphs.

Prerequisite: Permission of the department.

W.H. Cunningham.

- Mathematics 70.589W1

Combinatorial Optimization

Topics include optimal matching in non-bipartite graphs, Euler tours and the Chinese Postman problem. Other extensions of network flows: dynam-

ic flows, multicommodity flows, and flows with gains. Bottleneck problems. Matroid optimization. Enumerative and heuristic algorithms for the Travelling Salesman and other "hard" problems.

Prerequisite: Mathematics 70.588.

W.H. Cunningham.

- Mathematics 70.590T2

Seminars in Mathematics

- Mathematics 70.591F1, W1, S1

Directed Studies

- Mathematics 70.593F1, W1, S1

Project

This course is intended for students registered in the M.Sc. degree program in Information and Systems Science. Students pursuing the non-thesis option will conduct a study, analysis, and/or design project under the supervision of a faculty member. Results will be given in the form of a typewritten report and presented at a departmental seminar.

- Mathematics 70.594F1, W1, S1

Co-op Project

This course is intended for students registered in the co-operative Master's program in statistics. Students will register in this course during their work term; a grade will be assigned on the basis of a report submitted at the end of the work term.

- Mathematics 70.599F2, W2, S2

M.Sc. Thesis

- Mathematics 70.601W1

Topological Vector Spaces

Construction of new topological vector spaces out of given ones; local convexity and the Hahn-Banach theorem; compactness and the Krein-Milman theorem; conjugate spaces, polar sets.

Prerequisite: Mathematics 70.403.

Graham Zelmer.

- Mathematics 70.602W1

Harmonic Analysis on Groups

Transformation groups; Haar measure; unitary representations of locally compact groups; completeness and compact groups; character theory; decomposition.

B.M. Puttaswamaiah.

- Mathematics 70.603W1

Applications of Generalized Functions

Generalized integral transforms; Laplace,

Mellin, Hankel, Weierstrass, K- and Convolution transforms; generalized solutions of partial differential equations; further applications.

Prerequisite: Mathematics 70.502.

J.N. Pandey.

- Mathematics 70.608F1

Topics in Analysis

- Mathematics 70.609W1

Topics in Analysis

- Mathematics 70.610T2

Universal Algebra

Concept of a universal algebra; homomorphisms, kernels of homomorphisms, decomposition of homomorphisms; free word algebras and some of their properties; free algebras within classes of algebras; constructions of free members; equationally definable classes; polarity.

Vlastimil Dlab.

- Mathematics 70.611T2

Topics in Group Theory

- Mathematics 70.612T2

Category Theory

Categories and functors; limits; adjoint functors; triples and algebras; abelian categories; homological algebra.

Vlastimil Dlab.

- Mathematics 70.613T2

Topics in Ring Theory

- Mathematics 70.621F1

Topics in Topology

- Mathematics 70.622W1

Topics in Topology

- Mathematics 70.643T2

Mathematical Theory of Hypersonic Flow

Basic equations of inviscid, unsteady hypersonic flow; small disturbance theory, Newtonian theory; optimum body shapes; bluntbody theory; hypersonic flow past oscillating wedges and cones; hypersonic boundary layers.

Prerequisite: Mathematics 70.543 or permission of the department.

Paul Mandl.

- Mathematics 70.652W1

Advanced Design of Surveys

Foundations of survey sampling; maximum likelihood and Bayesian estimation; super population and random permutation models; multiple frame theory; analytical surveys; related topics.

Prerequisite: Mathematics 70.552 or permission of the department.

J.N.K. Rao.

- Mathematics 70.657F1

Topics in Probability and Statistics

- Mathematics 70.658F1

Topics in Probability and Statistics

- Mathematics 70.690T2

Seminars in Mathematics

- Mathematics 70.691F1, W1, S1

Directed Studies

- Mathematics 70.699F, W, S

Ph.D. Thesis

Department of Physics

The Department

Chairman of the Department: M.K. Sundaresan

Departmental Supervisor of Graduate Studies:

R.L. Clarke

The Department of Physics offers programs of study and research leading to the M.Sc. and Ph.D. degrees.

At the M.Sc. level, the department offers programs of study in the areas of research interest outlined below, in addition to a program in applied nuclear physics, with orientation towards reactor physics.

The Ph.D. program specializes in high energy physics and in some aspects of intermediate energy physics (muonic atoms), both experimental and theoretical.

Some of the research in the fields outlined below is being carried out in collaboration with institutions such as the NRC, the University of Chicago, Argonne National Laboratory, Fermilab, TRIUMF, SLAC, and others. The current research interests of the department are the following:

Theoretical Physics

Elementary particle physics; field theory, nuclear physics

Intermediate Energy Physics

Muonic atoms, both atomic and nuclear aspects

High Energy Physics

Study of elementary particle properties and interactions using major high energy accelerators; research in new instrumentation techniques (for example, streamer chambers, wire spark chambers, transition radiation detectors, etc.)

Medical Physics

Radiography — the uses of external γ -rays for density measurement and for imaging of internal structures in medical diagnosis and industrial applications, ultrasound measurements of tissues and imaging

Geochronology

Mass spectrometry, isotope geology; Rubidium-Strontium age determinations; isotopic abundance measurements, isotopic analysis of solids and gases

Laser Physics

Development work in transversely excited high-pressure carbon dioxide lasers, stressing the application of short high-voltage pulses to the discharge.

Master of Science

Admission Requirements

The normal requirement for admission is an Honours bachelor's degree with at least high second-class standing in physics or a related discipline. Refer to the general section of this calendar for further details regarding admission requirements.

Program Requirements

Each candidate will choose one of the following optional program patterns:

- Three full courses (of which at least two must be in physics and two must be at the 500 level) and a thesis equivalent to two full courses, which must be defended at an oral examination
- Four full courses (of which at least two must be in physics and three must be at the 500 level) and a thesis equivalent to one full course, which must be defended at an oral examination
- Five full courses (of which at least three must be in physics and four must be at the 500 level); one of these courses must be Physics 75.590.

No more than one 75.590 may be taken in the M.Sc. program. 75.590 and 75.591 may not both be taken in the M.Sc. program. The candidate must also pass a final comprehensive examination (written or oral, or both).

All candidates except those specializing in applied nuclear physics are normally expected to select and complete successfully either Physics 75.571 or 75.572.

Candidates in the area of applied nuclear physics (reactor physics) are normally expected to complete successfully Physics 75.553 and 75.554. One of the courses in this program must be Physics 75.590, or 75.599. The other three full (or six half-) courses must be selected from a list of courses in physics, engineering, or mathematics, in consultation with the supervisor of graduate studies.

All candidates are also expected to attend and participate in departmental seminars and colloquia.

Language requirements, prescribed to meet the needs of each student, will be determined by the candidate's supervisor.

Doctor of Philosophy

Admission Requirements

Applicants for admission into the Ph.D. program must ordinarily have a Master's degree in physics or a related discipline.

An applicant with an Honours bachelor's degree who has achieved an outstanding academic record and, in addition, exhibits very strong motivation and high promise for advanced research, may be admitted to the Ph.D. program directly. Such candidates will be required to complete at least 15 full courses, or the equivalent.

Students who have been admitted to the Master's program may be permitted to transfer into the Ph.D. program if they show outstanding academic performance and demonstrate high promise for advanced research during the first year of the Master's program.

Admission to the Ph.D. program is provisional, subject to satisfactory completion of a qualifying examination, which is set soon after entry.

Program Requirements

The minimum program requirements for the Ph.D. degree in Physics are the following:

- 10 full courses (or the equivalent), of which at least one non-thesis course must be at the 600 level in physics
- A thesis equivalent normally to 6-7 credits for a theory student, and 7-8 credits for an experimentalist, to be defended at an oral examination
- A comprehensive examination (written and oral) which normally will be completed prior to starting the Ph.D. thesis research
- Language requirements, as determined by the candidate's supervisor
- Attendance and participation in departmental seminars and colloquia.

Students who have been admitted to the Ph.D. program on the basis of a 15-course requirement,

which normally will require three years of full-time study, must complete the following:

- 15 full courses or the equivalent
- A comprehensive examination
- A research thesis equivalent to a maximum of eight of the 15-course requirement
- The language requirement outlined above.

Selection of Courses

The following senior undergraduate courses are approved for selection by the graduate students in the department (maximum one credit):

Physics

- 75.400 Fourth-year Laboratory
- 75.407 Selected Experiments From 75.400
- 75.408 Selected Experiments From 75.400
- 75.477 Introduction to Quantum Mechanics I
- 75.478 Introduction to Quantum Mechanics II: Applications

Graduate Courses*

Graduate students may register in the following courses, subject to the approval of the Department of Physics:

- Physics 75.522W1
Molecular Spectroscopy
Spectra of simple molecules; brief survey of atomic spectroscopy; rotations and vibrations of diatomic and polyatomic molecules and the methods of obtaining information about the geometrical structure of the molecule and the forces acting between the constituent particles from the observed rotation and vibration spectra; electronic structure of molecules as derived from a study of electronic spectra based mainly on molecular orbital theory. The description will be from the

*F, W, S indicates term of offering.

Courses offered in the fall *and* winter (or any other two terms) will be followed by T.

The number following the letter indicates the credit weight of the course: 1 denotes a half-course credit, 2 denotes a full-course credit, etc.

point of view of the experimentalist rather than the theorist.

Prerequisite: Physics 75.477 or Chemistry 65.310.

- Physics 75.532W1

Classical Electrodynamics

Covariant formulation of electrodynamics; Lenard-Wiechert potentials; radiation reaction; plasma physics; dispersion relations.

Prerequisite: Physics 75.437 or equivalent.

- Physics 75.553F1

Reactor Physics I

Brief review of orthogonal co-ordinate systems; divergence, Laplacian etc., in various co-ordinate systems; continuity equation; flow equations (heat, current, neutrons); diffusion of thermal neutrons (collisional energy transfer, scattering probability, statistical energy degradation); Fermi age-velocity theory; fast neutron flow equation; thermal multiplication pile; criticality criteria; solutions of flow and continuity equations: heat flow (various geometries and boundary conditions), neutron flow (moderation by graphite block).

Prerequisites: Physics 75.381, 75.386 or permission of the department.

- Physics 75.554W1

Reactor Physics II

Nuclear reactions, binding energy, resonance. Fission, products, energy release, cross sections, neutron multiplication, delayed neutrons. Reactors, criticality, size, fuel distribution, flux distribution. Stability, time constant, poisoning, control systems. Fuel cycles, fertile and fissile materials. Breeding, near breeders, fuel sources, fabrication, handling. Heat transfer and mechanical design. Safety, waste disposal, hazards. Grid systems, counter arguments, other sources. Isotope production.

Prerequisite: Physics 75.553 or permission of the department.

- Physics 75.561F1

Experimental Techniques of Nuclear and Elementary Particle Physics

The interaction of radiation and high energy particles with matter. Experimental methods of detection and acceleration of particles. Use of

relativistic kinematics. Counting statistics.

Beam optics.

Prerequisites: Physics 75.437, 75.468 and 75.477, 75.478.

- Physics 75.562W1

Physics of Elementary Particles

Description of properties of elementary particles; pions, kaons and baryons. Conservation laws, invariance principles and quantum numbers. Resonances observed in final state interactions. Three body phase space; Dalitz plot. SU_3 symmetry scheme for classifying elementary particles, mass formulae and electromagnetic mass differences. Weak interactions; decay of neutral kaons; CP violation in neutral K decays.

Prerequisite: Physics 75.477.

- Physics 75.564W1

Intermediate Nuclear Physics

Properties of the deuteron and the neutron-proton force. Nucleon-nucleon forces, isospin and charge independence. Nuclear models: Single particle shell model, shell model with interactions, pairing, quasi-particles, collective models, deformed shell model. Scattering theory: effective range theory, partial wave analysis, phase shifts. Interpretation of n-p and p-p scattering experiments. Interaction of nucleons with electrons. Interaction of nuclei with radiation: Multipole fields, transition rates, selection rules, internal conversion.

Prerequisite: Physics 75.468 or equivalent.

- Physics 75.571F1

Intermediate Quantum Mechanics with Applications

Review of the basic postulates of quantum mechanics; applications of quantum mechanics to non-relativistic system—atoms, molecules and nuclei. Scattering theory; applications. Dirac's one particle theory.

Prerequisites: Physics 75.477 and 75.478.

- Physics 75.572W1

Relativistic Quantum Mechanics

Relativistic wave equations. Expansion of S matrix in Feynman perturbation series. Feynman rules. An introduction to quantum electrodynamics without second quantization.

Prerequisite: Physics 75.571.

- Physics 75.581F1

Methods of Theoretical Physics I

This course and Physics 75.582 are designed for students who wish to acquire a wide background of mathematical techniques.

Prerequisite: Permission of the department.

- Physics 75.590T2

Selected Topics in Physics (M.Sc. level)

A student may, with the permission of the department, take more than one selected topic (but not as part of the M.Sc. program), in which case each full course in Physics 75.590 will be counted for credit. Not more than one selected topic may be taken for credit in any one academic year.

- Physics 75.591 F1, W1, S1,

Selected Topics in Physics (M.Sc. level)

- Physics 75.599F, W, S

M.Sc. Thesis

- Physics 75.660T2

Advanced Nuclear Physics

Review of nuclear forces. Meson theory of nuclear forces. Nuclear ground states: Hartree-Fock and Bruckner-Goldstone theories of nuclear matter. In-depth treatment of shell model and collective model. Theory of nuclear interactions.

Prerequisites: Physics 75.561, 75.564 and 75.571.

- Physics 75.663W1

Topics in Elementary Particle Physics

Phenomenology

This course is intended to develop familiarity with a wide variety of phenomenological concepts in dealing with elementary particle interactions, with special emphasis on Regge poles, cuts, absorption models, duality; inclusive reactions, deep inelastic scattering; CP violation in weak interactions, etc.

Prerequisites: Physics 75.562, 75.571 and 75.572.

- Physics 75.671F1

Quantum Electrodynamics

Relativistic quantum field theory; second quantization of Bose and Fermi fields. Reduction and LSZ formalism. Perturbation expansion and proof of renormalizability of quantum electrodynamics. Calculations of radiative corrections and applications.

Prerequisites: Physics 75.511, 75.532, 75.571 and 75.572.

- Physics 75.690T2

Selected Topics in Physics (Ph.D. level)

- Physics 75.691F1, W1

Selected Topics in Physics (Ph.D. level)

- Physics 75.699F, W, S

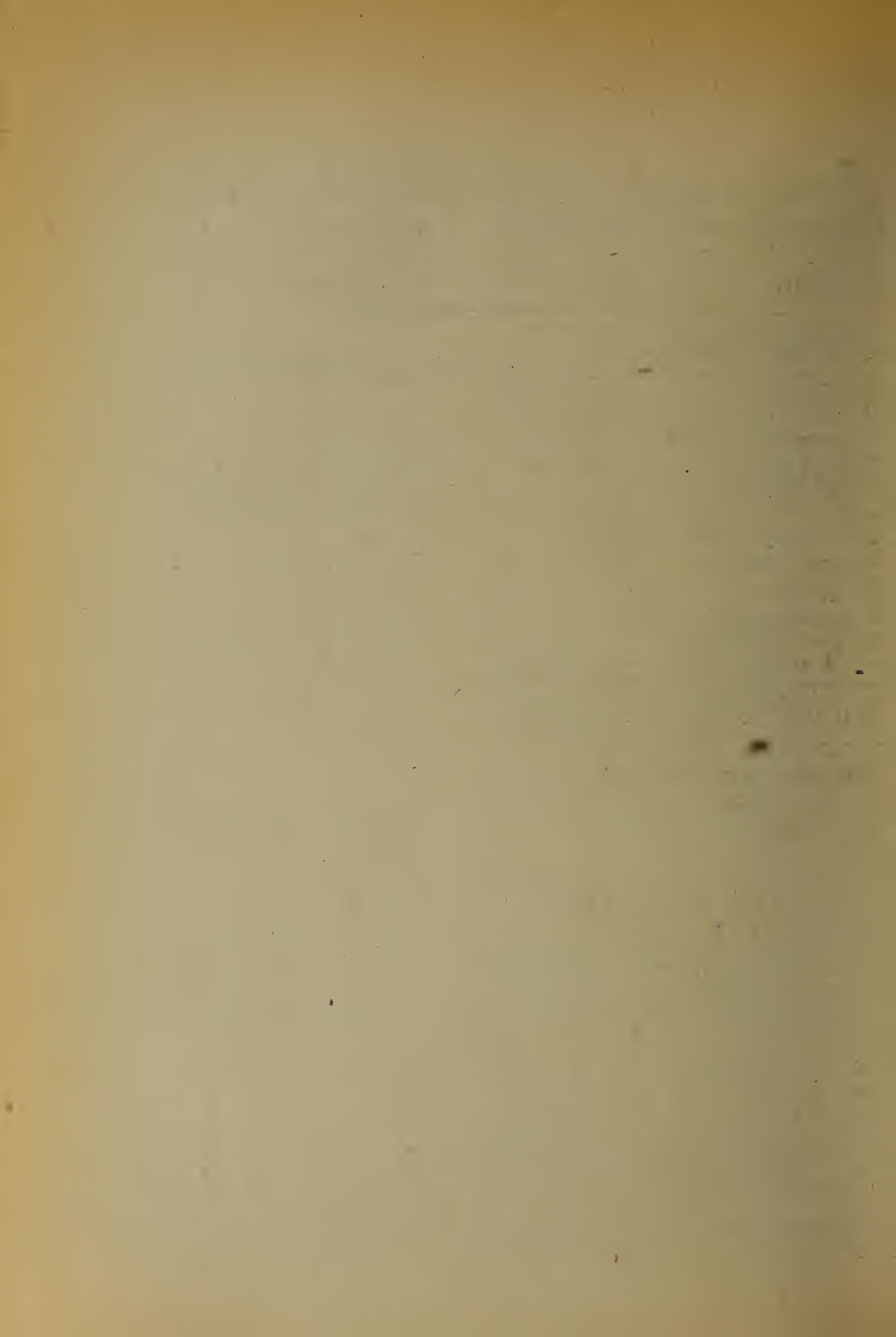
Ph.D. Thesis

Courses Not Offered in 1981-82

75.511 Classical Mechanics and Theory of Fields

75.582 Methods of Theoretical Physics II

75.660 Advanced Nuclear Physics



Departmental

Program

Descriptions

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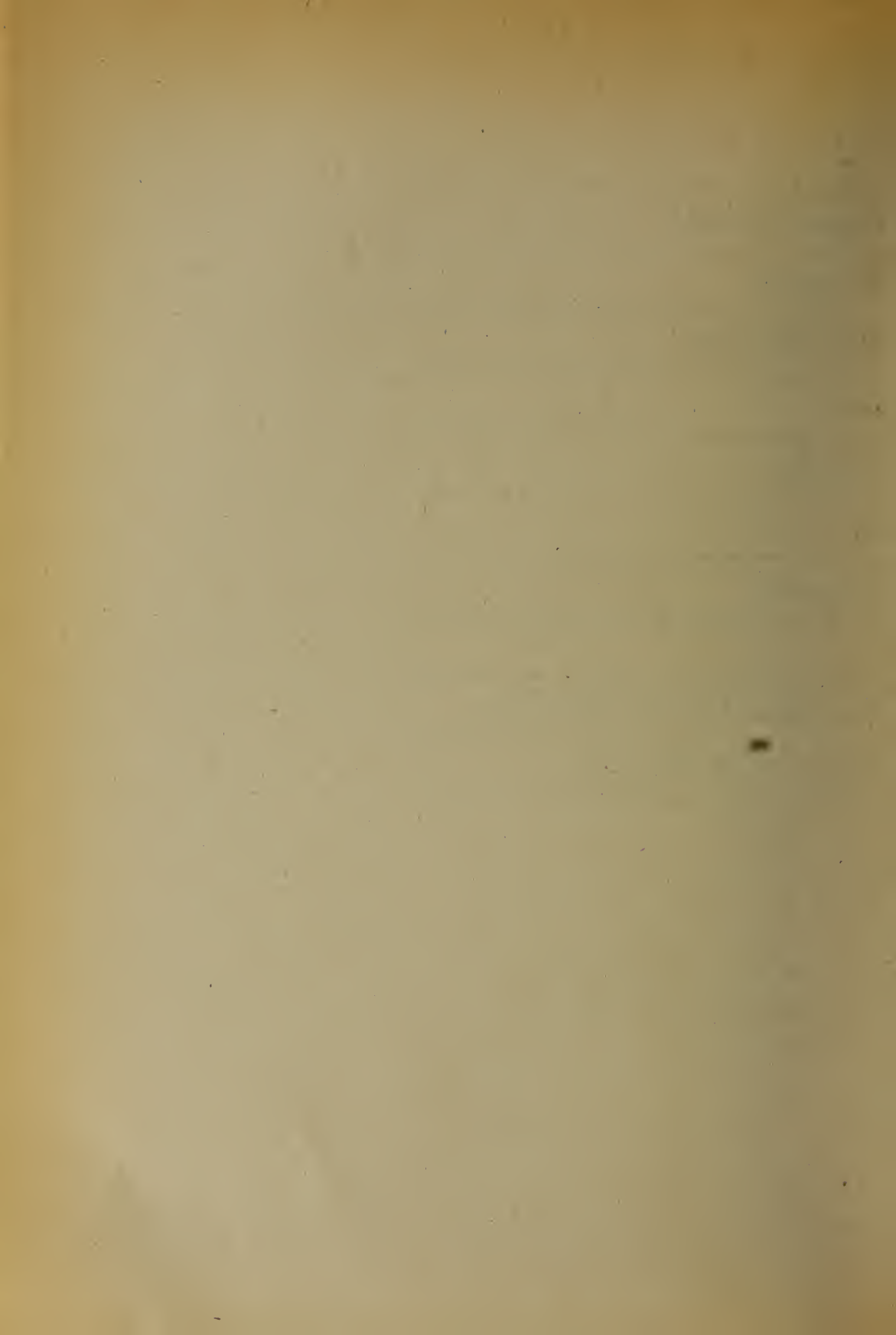
Details

of

Courses

Faculty of Social Sciences

Dean: D.P. Forcese



The School

Director of the School: J.B. Waugh

The School of Commerce does not offer a graduate program. Graduate courses are offered in collaboration with the School of Public Administration; members of the school also supervise graduate research.

Graduate Courses*

- Accounting 41.510F1

Management Accounting

An introduction to the underlying assumptions and basic principles of accounting, and an examination of the uses of accounting information by management. Topics include income measurement, asset valuation, financial statement analysis, cost systems, control reports, operating budgets, capital expenditure decisions, and alternative choice problems.

(Also offered as Administration 50.510)

Robert Beshara.

- Management Studies 42.511W1

Financial Management

An examination of the principles and practice of financial planning and control. Analysis of the problems of resource allocation and asset management under conditions of uncertainty. Techniques of capital expenditure analysis and analysis of funds flow.

Prerequisite: Accounting 41.510 (Administration 50.510) or permission of the school.

(Also offered as Administration 50.511)

A.J. Bailetti.

- Management Studies 42.518W1

Marketing for Non-Profit Organizations

Examination of the concepts of marketing relative to public demand, and the market for social goods and services. Contemporary marketing approaches and practices are analyzed and applied to purposes, programs, and environments of government agencies and departments, educational institutions, charities, and other public and social services.

N.G. Papadopoulos.

*F,W,S indicates term of offering.

Courses offered in the fall *and* winter (or any other two terms) will be followed by T.

The number following the letter indicates the credit weight of the course: 1 denotes a half-course credit, 2 denotes a full-course credit, etc.

Department of Economics

The Department

Chairman of the Department: T.K. Rymes
Supervisor of M.A. Studies: D.A. Smith
Supervisor of Ph.D. Studies: D.G. McFetridge
Director of Joint Doctoral Studies Program with the University of Ottawa: R.G. Bodkin

The Department of Economics offers programs of study and research leading to the M.A. and Ph.D. degrees.

Graduate students in economics undertake a thorough review of economic theory, together with an analysis of the Canadian economy, its institutions and history, and the working of public policy. Stress is placed on the understanding and application of quantitative methods to all aspects of economics. Although the programs are generally oriented towards policy problems, there is considerable opportunity for the development of specialized interests.

The main areas of specialization within the department include the following:

- Industrial Organization
- Public Finance
- Money and Trade
- Urban and Regional Economics
- Economic Theory
- Quantitative Methods

Qualifying Year Program

Applicants who have a general (pass) Bachelor's degree, or who otherwise lack the required undergraduate preparation, may be admitted to a Qualifying Year program designed to raise their standing to Honours status. If successful, they may be permitted to proceed to the Master's program the following year.

Refer to the general section of this calendar for details of the regulations governing the Qualifying Year.

Master of Arts

Admission Requirements

The normal requirement for admission to the Master's program is an Ontario Honours B.A. (or the equivalent) in Economics, with at least high second-class standing.

Applicants are expected to have had adequate preparation in statistics and mathematics. Credit in the following two undergraduate courses (or their equivalents) will be accepted: Economics 43.220: Statistical Methods in the Social Sciences, and Mathematics 69.107: Elementary Calculus and Mathematics 69.127: Topics in Calculus and Algebra. Students who do not satisfy the statistics requirement will be asked to take Economics 43.592: Empirical Methods, prior to proceeding to Economics 43.505: Econometrics. Students with inadequate mathematical backgrounds will be required to enrol in Economics 43.593: Mathematics for Economists.

The department may require certain applicants to write the Graduate Record Examination aptitude test and the Advanced Test in Economics offered by the Educational Testing Service.

Program Requirements

All Master's students in economics are required to complete the following courses:

Economics

- 43.501 Advanced Microeconomic Theory
- 43.502 Advanced Macroeconomic Theory
- 43.505 Econometrics
- 43.506 M.A. Tutorial

The tutorial serves to prepare candidates for the requirement of completing a written M.A. comprehensive examination. Details of this examination are outlined below.

In addition, each candidate must select and complete one of the following:

- A thesis, equivalent to one and one-half credits and approved course(s) for one credit
- Approved courses for two and one-half credits, one of which may be selected from among those offered in a related discipline, with permission of the department, through the supervisor of M.A. studies.

Comprehensive Examinations

Master's candidates in economics must undertake a written comprehensive examination to demonstrate their knowledge of economic theory and its policy implications.

There may also be an optional oral examination designed to give the student an opportunity to expand on the answers and solutions submitted in the written parts.

Academic Standing

A grade of B- or better must normally be obtained in each course counted towards the Master's degree. A candidate may, with the recommendation of the department, be allowed a grade of C+ or C (but not C-) in one full course or each of two half-courses.

Doctor of Philosophy

The Carleton Ph.D. program is principally concerned with Canadian economic policy.

The course content of the program must be undertaken on a full-time basis; completion of the overall Ph.D. requirements entails a minimum of two years of study.

It is planned that, beginning July 1, 1981, a new Ph.D. program in Canadian economic policy and economic development will be launched, to be offered jointly by the combined economics departments of Carleton University and the University of Ottawa. Details of that new program follow on page 150 of this calendar. Students already registered in the Ph.D. program at Carleton will continue to follow the requirements and courses as outlined up to page 150 of this calendar.

Admission Requirements

The normal requirement for admission into the Ph.D. program is a Master's degree (or the equivalent) from a recognized university, with high second-class standing. The department may require certain applicants to write a comprehensive entrance examination.

Transfer from Master's to Ph.D. Program

A student who shows outstanding academic performance, and who demonstrates high promise for advanced research during the Master's program may, subject to meeting the requirements below, be permitted to transfer into the Ph.D. program without completing the M.A. program:

- The student will have completed Economics 43.501, 43.502, 43.505, plus an additional four half-courses at the graduate level.
- The student must make formal application to the Graduate Studies Committee at least one month before the beginning of the term in which he/she wishes to begin the Ph.D. program.
- Students permitted to transfer into the Ph.D. program will be required to complete the equivalent of 11½ courses.

Program Requirements

Ph.D. candidates are expected to have or acquire proficiency in mathematics and statistics; this requirement must be satisfied before proceeding with the program.

Doctoral candidates would usually complete:

Economics

- 43.600 Economic Theory I: Microeconomics
- 43.601 Economic Theory II: Macroeconomics
- 43.602 Analysis of Microeconomic Policy
- 43.603 Analysis of Macroeconomic Policy
- 43.606 Economic Models and Policy Applications
- 43.611 Workshop in Economic Policy

- Four other graduate half-courses (or the equivalent) in economics; with the permission of the department, through the supervisor of Ph.D. studies, one full course may be selected from a related discipline.
- A formal dissertation, equivalent to five full course credits, which must be defended at an oral examination
- Three written comprehensive examinations (theory, policy, and an optional field).

Academic Standing

Doctoral students must normally obtain a grade of B- or better in each course counted towards the degree.

Qualifying Year Courses*

- Economics 43.590F1

Microeconomic Theory

This course is required for Qualifying Year students whose preparation in microeconomic theory is judged to be inadequate.

- Economics 43.591W1

Macroeconomic Theory

This course is required for Qualifying Year students whose preparation in macroeconomic theory is judged to be inadequate.

- Economics 43.592F1

Empirical Methods

Principles of statistical theory, probability, testing and introduction to regression analysis. Designed for those judged deficient in undergraduate statistical training.

- Economics 43.593F1

Mathematics for Economists

This course provides an introduction to the use of mathematical techniques in economics. Topics in optimization, such as Lagrangean multipliers and second order conditions, will be emphasized. Applications of these tools to various parts of economic theory will be presented.

- Economics 43.594F1, W1, S1

Qualifying Year Tutorial

A tutorial for Qualifying Year students whose program includes the full slate of Qualifying Year core courses (microeconomic theory, macroeconomic theory, empirical methods, and applied economics).

- Economics 43.595F1, W1, S1

Applied Economics

- Economics 43.597F1, W1, S1

Qualifying Year Directed Readings

Graduate Courses*

Enrolment in the graduate courses requires the permission of the department, through the supervisor of graduate studies.

- Economics 43.501F1

Advanced Micro-Theory

An examination of the theories of the behaviour of individual economic agents: consumers and producers and their relation to the theories of price and distribution. Students are introduced to the controversies in the study of individual economic behaviour.

- Economics 43.502F1

Advanced Macro-Theory

Macroeconomic theory and its implications for economic policy are surveyed in this course, comparing alternative approaches for a variety of topics.

- Economics 43.505F1

Econometrics

Estimation and testing of the general linear model, with emphasis on problems such as autocorrelation, heteroscedasticity, multicollinearity, and problems due to distributed lags and errors in variables. Introduction to simultaneous equations systems, identification and estimation.

Prerequisites: Economics 43.220, 43.592, or equivalent.

- Economics 43.506F1, W1, S1

M.A. Tutorial

Student takes any two of three.

*F,W,S indicates term of offering.

Courses offered in the fall *and* winter (or any other two terms) will be followed by T.

The number following the letter indicates the credit weight of the course: 1 denotes a half-course credit, 2 denotes a full-course credit, etc.

*F,W,S indicates term of offering.

Courses offered in the fall *and* winter (or any other two terms) will be followed by T.

The number following the letter indicates the credit weight of the course: 1 denotes a half-course credit, 2 denotes a full-course credit, etc.

- Economics 43.507F1, W1, S1

Directed Readings

Prerequisite: Permission of the department.

- Economics 43.508F1, W1, S1

Special Topics

Prerequisite: Permission of the department.

- Economics 43.509F1, W1, S1

Directed Research

At least one paper will be required from a student enrolled in any one of these courses.

Prerequisite: Permission of the department.

- Economics 43.511F1

Canadian Economy I

A detailed examination of aspects and problems of the Canadian economy. A variety of topics may be discussed, including the economic development of Canada, the structure of the current national and regional economies, industrial organization, factor market operation, income distribution, the role of international trade and capital flows, and the stability of the economy.

- Economics 43.512W1

Canadian Economy II

Economic theory applied to the workings of the Canadian economy. Empirical estimation of various aspects of factor market operation, production, distribution and aggregate economy. Participants are expected to prepare and present papers for discussion.

- Economics 43.521F1

History of Economic Thought I

The crucial achievements in economic theory and doctrine in the nineteenth and twentieth centuries are studied. Special emphasis is given to the interrelationship between the social environment and economic thought — especially to the role of economics in the development of the national state and international institutions.

- Economics 43.522W1

History of Economic Thought II

A continuation of 43.521.

Prerequisite: Economics 43.521 or permission of the department.

- Economics 43.525W1

Mathematical Economics

A synthesis of some important topics in economic theory, with almost exclusive use of mathematical models. Some of these are: general equilibrium of the firm and/or the household, and related matters; general equilibrium of exchange and production; stability of equilibrium; linear programming, games and the theory of the firm; selected topics in economic dynamics; value theory; social welfare functions; optimizing techniques and public policy.

Prerequisite: Mathematics 69.201, Economics 43.200, 43.210 or equivalent.

May be taken by senior undergraduates, with permission of the department.

- Economics 43.531F1

Firms and Markets

An examination of theories pertaining to industrial organization and their application to particular industries in Canada and elsewhere by way of empirical studies.

- Economics 43.532W1

Competition Policy

An examination of the rationale and application of competition policy with particular attention to the Canadian economy.

- Economics 43.533S1

Regulation and Public Enterprise

An examination of regulation and public enterprise as alternative approaches for influencing industry conduct and performance.

- Economics 43.536F1

Comparative Economic Systems I

An analysis of the structure and functioning of economic systems. Some discussion of the notion of an economic system and of the criteria used to evaluate the performance of systems.

- Economics 43.537W1

Comparative Economic Systems II

A continuation of 43.536.

Prerequisite: Economics 43.536 or permission of the department.

- Economics 43.541F1

Public Economics: Expenditure

A discussion of the role of government expenditure, both in theory and with reference to the Canadian economy.

- Economics 43.542W1

Public Economics: Taxation

An analysis of the effects of various forms of taxation on economic performance.

- Economics 43.543W1

Public Choice

Democracy, bureaucracy, and economic policy. The public choice of fiscal constitutions, tax shares, and equity rules; voting coalitions and income distribution; the public provision of private goods; public sector size, fiscal illusion and taxpayer revolts.

- Economics 43.545W1

Theoretical Welfare Economics

A rigorous treatment of the theoretical foundations of welfare economics. An introduction to axiomatic social choice theory, with emphasis on the determination of collective choice rules from individual choice rules, the various types of measurability and comparability assumptions and impossibility results of the Arrow-type.

- Economics 43.547W1

Project Evaluation

An analytical treatment of the principles of project evaluation and their applications.

Prerequisite: Economics 43.501 or permission of the department.

- Economics 43.551F1

Economic Dynamics: Business Cycles

An analysis of the nature and causes of fluctuations in income, prices and employment. Short-run dynamic models arising from multiplier-accelerator and other economic processes will be examined. Cycle simulation, forecasting, stability conditions, anti-cyclical policy, and the problems of maximizing growth without cycles will be discussed.

- Economics 43.552W1

Economic Growth

An examination of modern theories of economic growth. Constraints of renewable and non-renewable resources. Trade-offs between economic growth and environmental decay. Problems of inter- and intra-generational income distribution.

- Economics 43.553W1

Stabilization Policy

An examination of policies aimed at achieving internal and external stability. The implications of economic growth for stabilization policies will be discussed.

Prerequisite: Economics 43.502.

- Economics 43.555F1

The Economics of Development

An examination of some key problems of development in the "Third World", including theoretical analysis and policy formulation and evaluation. Topics considered may include some of the following: dualistic models of development, choice of production technique, income distribution, choice of organizational form, intersectoral resource allocation, etc.

Prerequisites: Economics 43.590 and 43.591 or equivalents.

- Economics 43.561F1

International Trade Theory and Policy

International trade theory and its implications for economic policy are examined, with emphasis on topics such as determinants of trade and specialization, gains from trade and commercial policy, international factor mobility, growth and development.

- Economics 43.562W1

International Monetary Theory and Policy

International monetary theory and its implications for economic policy are examined, with emphasis on topics such as sources of equilibrium and disequilibrium in the balance of payments, balance-of-payments adjustment under fixed versus flexible exchange rates, international capital movements, and recent issues in the international monetary system.

- Economics 43.567F1

Monetary Theory and Policy I

This course is designed to provide the analytical tools of monetary theory and policy. The effects of monetary change on economic activity, the foundations of monetary theory, and classical, Keynesian and modern monetary analyses are discussed. The policy implications of the "optimum quantity of money", various estimates of money supply and demand, difficulties of imple-

menting policy in open and closed economies and in a growth context, are also examined.

- Economics 43.568W1

Monetary Theory and Policy II

A continuation of 43.567.

Prerequisite: Economics 43.567 or permission of the department.

- Economics 43.571W1

Advanced Econometrics

Selected topics from estimating and testing the regression and simultaneous equation models are analyzed. The main topics include maximum likelihood estimation, statistical analysis of residuals, autoregressive and other time series models, multivariate regression model, and elements of asymptotic statistical theory within the context of the simultaneous equation model.

Prerequisites: Economics 43.485, 43.505 or equivalent.

- Economics 43.581F1

Regional Analysis

Regional economic disparities in Canada, theories and public policy relating thereto. Consideration will be given to the concept of regions, location of industry and industrial structure, and to growth determinants. Various aspects of policy designed to improve the fortunes of the less-prosperous regions will be examined.

- Economics 43.582W1

Urban Analysis

An examination of the economic properties of urban areas. Attention will be focused on the macro-dynamics of urban development, together with the micro-statics of the equilibrium properties of the urban land market. The impact of public policy in Canada on urban areas will be assessed in the light of the formal analysis.

- Economics 43.599F3, W3, S3

M.A. Thesis

- Economics 43.600F1

Economic Theory I: Microeconomics

This course includes lectures and seminars on selected aspects of topics such as consumer behaviour, producer behaviour, market structures, income distribution, and general equilibrium. Attention will be given not only to

descriptive theory but also to implications for economic policy.

Prerequisites: Economics 43.501 and 43.543, or equivalents.

- Economics 43.601F1

Economic Theory II: Macroeconomics

Lectures and seminars on critical aspects of consumption, investment, government expenditure, taxation, external economic equilibrium, money, prices, and employment stabilization and economic growth. Emphasis will be placed on policy implications.

Prerequisites: Economics 43.502 and 43.553, or equivalents.

- Economics 43.602W1

Analysis of Microeconomic Policy

An examination and evaluation of microeconomic policies. Various aspects of policy issues are analyzed. These will be drawn from such areas as industrial economic policy, renewable and non-renewable resources, communication and transportation, regional economic policy, social economic policy, and operations of the labour market.

- Economics 43.603W1

Analysis of Macroeconomic Policy

An examination and evaluation of macroeconomic policies. Policy issues are discussed, alternative solutions formulated, and their outcomes considered. Attention will focus upon such areas as incomes policy, taxation and budgetary policy, central bank operations, exchange rate manipulation, and commercial policy.

- Economics 43.606F1

Economic Models and Policy Applications

Selected topics in the literature of econometric model building, and consideration of their relevance to the design of economic policy. Topics include aggregation bias, causality and recursivity, analysis of dynamic properties of reduced forms, among others. Also included is a survey and comparative analysis of existing Canadian macro-econometric models. A detailed examination of one Canadian model will be made, and students will have the opportunity to conduct policy simulations with it.

Prerequisite: Economics 43.505 or equivalent.

- Economics 43.608F1

Topics in Advanced Micro-Theory

- Economics 43.609W1

Topics in Advanced Macro-Theory

- Economics 43.611F1, W1, S1

Workshop in Economic Policy

Forums in which graduate students and faculty can work together on policy questions. Workshops will be held in the following fields: urban and regional economics, economic organization and development, money and trade, public economics, and quantitative methods.

Doctoral students are required to join two workshops and present a paper to one of these groups.

The courses listed below (up to and including 43.697) indicate the areas in which members of the department are prepared to supervise directed reading, research and seminars. Not all the courses will necessarily be offered in any one year. Permission of the department is required.

- Economics 43.630F1

Industrial Organization I

- Economics 43.631W1

Industrial Organization II

- Economics 43.640F1

Public Finance I: Advanced Taxation Theory

- Economics 43.641W1

Public Finance II: Advanced Expenditure Theory

- Economics 43.660F1

Theory of International Trade

- Economics 43.661W1

Monetary Theory

- Economics 43.662W1

Balance of Payments and International Monetary Theory

- Economics 43.680F1

Urban and Regional Economics I

- Economics 43.681W1

Urban and Regional Economics II

- Economics 43.696F1, W1, S1

Selected Advanced Topics

- Economics 43.697T2

Selected Advanced Topics

- Economics 43.699F10, W10, S10

Ph.D. Thesis

The doctoral program in Canadian economic policy and economic development, to be offered jointly by the Departments of Economics at Carleton University and the University of Ottawa, is planned for commencement July 1, 1981.

This new Ph.D. program stresses the application of economic theory to the analysis of Canadian economic policy and economic development. Five areas of specialization are available for intensive study and thesis research: public economics, industrial organization, regional and urban economics, international economics, and economic development. The program of courses and thesis guidance, drawing upon the faculty of the two departments, will encompass course requirements, policy-oriented workshops, comprehensive examinations, and a thesis. Students who have achieved at least high second-class standing at the M.A. Economics level, or who have equivalent training, may be admitted to the joint Ph.D. program. They will be required to take one half-course at the graduate level in Canadian or North American economic history (or the equivalent) if they have not already taken such a course at the graduate level. Students are also expected to have or to acquire proficiency in mathematics and statistics before proceeding with the program.

Students admitted to the joint Ph.D. program are required to complete three compulsory half-courses: microeconomic theory, macroeconomic theory and models for economic policy, or research methods in economics. Students are required to take three half-courses in each of two fields of specialization. Credit may be given for previous graduate courses in either of the chosen fields. Courses in the fields of specialization will be:

Public Economics

- Public Finance: Expenditure
- Public Finance: Taxation
- Topics in the Theory of Public Economics
- Economic Policy in a Federal State

Industrial Organization

- Firms and Markets
- Competition Policy
- Regulation and Public Enterprise

Regional and Urban Economics

- Regional Economics
- Urban Economics
- Regional Policy
- Urban Policy

International Economics

- International Trade Theory and Policy
- International Monetary Theory and Policy
- International Aspects of Development

Economic Development

- Theory of Economic Development
- Economic Development Policies
- International Aspects of Development

Students must also attend four half-courses in two of the three workshops being offered by the two departments, those chosen being central to dissertation interest and research. They will receive credit for only two half-courses for those two terms in which they make their presentation to the workshops. The workshops are:

- Government and the Market Place
- Evaluation of Public Budgets
- Canada in the World Economy

Each student will attend a full course (or two half-courses) Ph.D. tutorial, will be required to write and defend orally three comprehensive examinations (theory, policy, field), and will be required to write and defend orally a Ph.D. dissertation. Doctoral students will be required to obtain a grade of B- or better in each of the courses (required, field of specialization, workshop, tutorial) counted towards the degree.

Further details about this joint Ph.D. program may be obtained by writing to the Director of Doctoral Studies, Joint Doctoral Program in Economics, either at the Department of Economics, Carleton University, Ottawa, K1S 5B6, or at the Department of Economics, Département de Science Economique, University of Ottawa, Université d'Ottawa, Ottawa, K1N 6N5.

Department of Geography

The Department

Chairman of the Department: D.B. Knight
Departmental Supervisor of Graduate Studies:
J.K. Torrance

The Department of Geography offers programs of study and research in physical and human geography leading to the degree of Master of Arts. Inquiries are welcomed about interdisciplinary topics and post-M.A. study that may be undertaken in co-operation with other departments of the University.

The program of study for each student is based on the interests of the individual. An advisory committee, consisting of the student's research supervisor and at least two other members of the department, is set up to monitor and provide guidance for the student's research. The department has excellent laboratory facilities for the geotechnical study of near surface processes, and the physics, chemistry, and thermodynamics of earth materials. There is a large map library and a well-equipped cartography laboratory as well as a mini-computer/plotter/digitizer. These facilities are supported by a highly qualified full-time staff in laboratory instrumentation, cartography and data processing. The location of the University in the nation's capital offers the student access to important resources, such as the National Library, National Archives, and Statistics Canada.

Currently, the main areas of specialization in the department are the following:

Physical Geography and Geotechnical Science

Studies of natural processes close to earth's surface, especially as they apply to environmental management: climate-ground interaction, micro-meteorology in frozen ground regions, the chemical, physical and thermodynamic properties of soils and sediments, and hydrology and sedimentology of fluvial processes in glacial and periglacial environments. Current emphasis in investigations of geotechnical concern are cold region phenomena, soil-water relations and stability of marine clays.

(J.P. Johnson, M.W. Smith, J.K. Torrance,
T.P. Wilkinson, P.J. Williams)

Rural and Resource Development

Identification of development processes; the interplay of population, political, demographic, socioeconomic variables with land resources and spatial factors. Frontier settlement, rural-urban evolution in developing countries, and recreational land use are of particular interest.

(D.M. Anderson, D.B. Knight, G.C. Merrill,
M.W. Smith, D.R.F. Taylor, J.K. Torrance,
A.I. Wallace)

Cultural, Historical and Political Geography

The effect of cultural attitudes and techniques on the evolution of human groups, their organization of earth's space and resources in past and present landscapes; cross-cultural studies, focusing particularly on the role of political and religious authority and ideology in changing the physical environment; concepts of territory and territoriality; and perception of the environment and settlement history.

(John Clarke, D.B. Knight, G.C. Merrill,
D.R.F. Taylor)

Economic and Urban Geography

Identification of basic spatial regularities in the socioeconomic organization of human activity. Spatial decision making and spatial dynamics as exemplified in the internal structure of urban places, industrial location, regional organization and characteristics of transport systems.

(David Bennett, D.M. Ray, J.E. Tunbridge,
A.I. Wallace)

Cartography

Research and course work in cartography is possible within the department. The opportunity for wider experience may be obtained through arrangements by which a student may take for credit at Carleton one or more courses in cartography, offered by the Department of Geography, Queen's University. The principal areas of focus are map design and history of cartography at Queen's, and applied aspects of computer cartography at Carleton.

Students may register in either department, and will follow the normal regulations and requirements of their university of registration. When

appropriate for students in the co-operative program, representatives from both universities may be members of a student's thesis examining board.

Financial aid for transport between cities will be provided by the home department.

Systematic interests of departmental members are applied to regions of special interest: Africa (Knight, Taylor); Southwest Pacific (Knight); Arctic and Subarctic (Smith, Johnson, Williams); Canada (Anderson, Clarke, Wallace, Knight).

Qualifying Year Program

Applicants with exceptional promise who have a general (pass) Bachelor's degree, or who have substantially less than the Honours B.A. in Geography may be admitted to a Qualifying Year program. To be considered for admission into the Master's program, Qualifying Year students must attain at least an overall high second-class standing in their Qualifying Year geography courses. The general section of this calendar provides details about the regulations governing the Qualifying Year.

Master of Arts

Admission Requirements

The normal requirement for admission into the Master's program is an Honours B.A. or B.Sc. in Geography with at least high second-class standing. Applicants who have taken their undergraduate degree in the physical or natural sciences or engineering, as well as in physical geography, will be considered if their research interest coincides with those of the department. Applicants in human geography may be accepted from related fields if their proposed research is closely related to faculty research experience. Students with academic deficiencies may be required to take additional courses.

Program Requirements

The M.A. in Geography is expected to take 12 months, but field work may necessitate some extension. All Master's students in geography are

required to complete a minimum of five full courses or the equivalent, including an M.A. thesis (equivalent to two full courses) which must be defended at an oral examination. A reading knowledge of the language which is essential to his or her research is required of all students.

Graduate Courses*

In addition to the selection of courses offered by the department, graduate students in geography are encouraged to consider, in partial fulfilment of their degree requirements, appropriate courses offered in such disciplines as biology, chemistry, economics, engineering, geology, history, international affairs, physics, political science and sociology.

Courses at the University of Ottawa may also be taken for credit in a Carleton M.A. program. Permission of departments in both universities is required.

The following courses, normally offered annually, are scheduled for 1981-82:

- Geography 45.500F1

Graduate Research Seminar

The application of scientific principles of investigation to contemporary research in geography. This course is suitable for students regardless of specialization.

David Bennett.

- Geography 45.517F1, W1, S1

Field Study and Methodological Research
Field acquisition and analysis of geographic material. Supervised field observations and methodology. Individual or group basis, by special arrangement.

Co-ordinator: J.K. Torrance.

*F,W,S indicates term of offering.

Courses offered in the fall *and* winter (or any other two terms) will be followed by T.

The number following the letter indicates the credit weight of the course: 1 denotes a half-course credit, 2 denotes a full-course credit, etc.

- Geography 45.520F1

Rural-Urban Interaction in Africa

The problems facing developing nations today with emphasis on their spatial aspects. Examples will be drawn from African nations.

(Also offered as International Affairs 46.575)

D.R.F. Taylor.

- Geography 45.532F1

Soil Thermal and Hydrologic Regimes II

Instrumental techniques for investigation of hydrological and thermal processes near the earth's surface, laboratory instrumentation, and analysis of laboratory and field procedures in geotechnical science.

P.J. Williams.

- Geography 45.533W1

Periglacial Geomorphology

Permafrost, its distribution and significance, seasonal ground freezing, ground thermal regime, physical, thermodynamic and geotechnical properties of freezing and thawing soils, terrain features ascribable to frost action, and solifluction and patterned ground.

P.J. Williams.

- Geography 45.534W1

Aspects of Clay Mineralogy and Soil Chemistry

The role of clay minerals in soils will be considered from a geotechnical and/or biological perspective.

J.K. Torrance.

- Geography 45.535W1

Glaciology

The flow and temperature regimes of glaciers and ice sheets, classification and growth of lake and river ice, the behaviour of ice under load, and the diagenesis of snow and melt processes.

- Geography 45.537W1

Soil Resources

The properties of soils; development, classification, productive potential, and management problems of the world's soils. Primary emphasis will be agricultural, but environmental and geotechnical aspects will be considered.

J.K. Torrance.

- Geography 45.543F1

Selected Concepts in Cultural Geography

In 1981-82 the primary focus will be on the geographical dimensions of selected plural societies.

G.C. Merrill.

- Geography 45.545W1

Problems in Historical Geography

Philosophical and methodological approaches in geography, history, and historical geography, emphasizing the use of primary documents, model building, and statistical methods as they relate to historical geography of Canada.

John Clarke.

- Geography 45.546F1

Geographical Insights to Canadian Problems

The geographical basis of Canada's settlement, economic, political and social development. Themes include the role of the physical environment, regions and regionalism, geography of economic activity and welfare, urban systems, and geopolitical perspectives. Not normally available to geography students.

Co-ordinator: John Clarke.

- Geography 45.550F1

Spatial Dynamics of Urban and Regional Systems I

A review of recent theoretical and methodological debate in the field, followed by concentration on city-system development, the behaviour of multi-locational enterprises, and the nature of regional economic disparities and policy responses.

A.I. Wallace.

- Geography 45.551W1

Spatial Dynamics of Urban and Regional Systems II

An approach to the analysis of urban and regional system behaviour, embodying theoretical insights and research methodologies based on general systems theory and its applications.

D.M. Ray.

- Geography 45.555W1

Tourism and International Development

The nature and effect of tourist development in various parts of the world, and the role of tourism in developed and developing countries.

G.D. Taylor.

- Geography 45.570W1

Problems of Development in Arctic and Subarctic Environments

Research seminar on specific problems in Canada's northland. Experience from other parts of the world will be incorporated when appropriate.

- Geography 45.572W1

Issues in Canadian Resource Development

An overview of Canadian natural resource problems and prospects, concentrating on agriculture, forestry, energy, minerals and offshore resources. A.I. Wallace.

- Geography 45.579F1

Research and Development in Recreational Geography

Contemporary trends and research in recreational demand, travel, user activities; evaluation of landscape for recreation, preservation of recreational "quality", parks and recreation systems planning. D.M. Anderson.

- Geography 45.580W1

Spatial Information Systems and Computer Cartography

The concepts and problems involved with spatial information systems, especially those with a mapping component. D.R.F. Taylor.

- Geography 45.581

Seminar in Map Design

A seminar on selected problems in the design, construction, and appreciation of maps. (Offered at Queen's University as 38.850)

- Geography 45.582F1

Seminar in Historical Cartography

A seminar on selected problems in historical cartography. (Offered at Queen's University as 38.877)

- Geography 45.590F1, W1, S1

Graduate Tutorial

Tutorial, directed reading or research, offered on an individual basis, to meet specific program needs; may be taken in one of the areas of specialization of the department.

Co-ordinator: J.K. Torrance.

- Geography 45.599F4, W4, S4

M.A. Thesis

Thesis supervision will be given in all areas of specialization of the department, as listed in the calendar section identifying departmental specializations.

Co-ordinator: J.K. Torrance.

Courses Not Offered in 1981-82

45.510 Models of Geographic Processes

45.530 Soil Thermal and Hydrologic Regimes I

45.536 Floating Ice Studies

45.540 Territory and Territoriality

The Norman Paterson School of International Affairs

The School

Director of the School: J.H. Sigler

The Norman Paterson School of International Affairs, established in 1965 with the generous support of the Honourable Norman M. Paterson, offers a program of studies leading to the M.A. degree.

The program focuses on four themes: international integration, development studies, Canada's international policies, and conflict analysis. Attention is paid to the role of international institutions, the foreign policies of other countries, and to selected regional studies. The school maintains close co-operation with the Institute of Soviet and East European Studies, and with committees designed to encourage and co-ordinate faculty and student interests in Africa, Asia and Latin America.

A specialized resource centre is located in the school and is staffed by a full-time information specialist. Students and faculty have access to a broad range of current bibliographic materials using the resources of the national capital area as well as on-line computerized bibliographic services in foreign policy and international affairs. The school also participates in the Social Science Data Archives at Carleton, and students have access to a full range of data sets available from the Inter-University Consortium for Political Research as well as the Canadian Institute of Public Opinion poll data and the Human Relations Area Files.

Qualifying Year Program

Admission Requirements

The Qualifying Year program is designed to enable students with at least second-class standing, but with inadequate background in the disciplines relevant to the M.A. program, to make up deficiencies. Candidates with a general (pass) Bachelor's degree in a discipline closely related to international affairs, and those with an Honours bachelor's degree in an unrelated discipline, may be required

to take three to five Qualifying Year courses before being eligible to enter the Master's program.

Students in the Qualifying Year are encouraged to select a core theme. They may also wish to select an area emphasis and to take courses that will enable them, in the M.A. year, to engage in specialized study in the problems of a region having particular relevance to the core theme they have elected. Students should also take appropriate courses in order to prepare them to fulfil the language requirements of the M.A. program.

Under current practice, students are expected to achieve a high second-class standing in Qualifying Year courses in order to be admitted to the M.A. program.

Program Requirements

International Integration

Two courses are recommended: Economics 43.360 or 43.361 (half-courses), and Political Science 47.360 and 47.361 (half-courses), or 47.460 and at least two courses relating to a region where the nature and effects of integration may be studied; for example, courses bearing on the European Economic Community, Comecon, or an integration process in less-developed areas.

Development Studies

The following courses will normally be required: Economics 43.360 or 43.361 and 43.363 (half-courses), and at least one course in geography, political science, or sociology and anthropology relevant to this theme. Particularly recommended are courses on one of the developing regions: Geography 45.330 or 45.380 and 45.381 (half-courses), Political Science 47.310, 47.315, or 47.411, Anthropology 54.230 and 54.362, and Sociology 53.360.

Canada's International Policies

The following courses are recommended: History 24.334 and 24.336; Economics 43.325 and 43.360, 43.361 and 43.380 (half-courses); and Political Science 47.361, 47.365 and 47.366 (half-courses).

Conflict Analysis

The following courses are recommended: History 24.380, 24.480 or 24.481; Law 51.463; Political Science 47.361 and 47.365 (half-courses) and 47.270 and 47.460; and Sociology 53.306 and

53.358. Also recommended are courses dealing with other approaches to conflict or with regions in which the student may wish to apply conflict theory.

Master of Arts

Admission Requirements

The minimum requirement for admission into the Master's program is an Honours bachelor's degree in a discipline related to international affairs. Under current practice, at least a high second-class standing is normally required for consideration for admission to the program.

Students may wish to provide scores on the Graduate Record Examination aptitude test in order to assist the admissions committee.

The Faculty of Graduate Studies and Research requires applicants whose native tongue is not English to be tested for proficiency in English, as described in the application for admission section, page 12 of the general regulations in this calendar.

Candidates who lack the required background in international affairs will be expected to complete a maximum of two additional courses. Core seminar requirements are listed under program requirements for Qualifying Year.

Students admitted to the international development core are strongly encouraged to take an undergraduate half-course in development economics before beginning the M.A. program in September. Students admitted to either international integration or Canada's international policies core areas are strongly encouraged to take an undergraduate half-course in international economics before beginning their programs in September. Otherwise, these requirements (additional to the M.A.) will have to be taken simultaneously with the M.A. program and result in some delay in its completion.

Program Requirements

The normal program requirements for M.A. students in international affairs are:

- One interdisciplinary core seminar or equivalent selected from the following:

International Affairs

46.500 International Integration

46.505-46.508 Development Studies (two must be selected)

46.510-46.511 Canada's International Policies (both must be selected)

46.515 Conflict Analysis

- Two other approved courses (or the equivalent) in international affairs or related disciplines, if a student elects to write a thesis

- Three other approved courses (or the equivalent) in international affairs or related disciplines, if a student elects to write a research essay

- A thesis (valued at two credits) or a research essay (valued at one credit) involving original research on an approved subject in the field of international affairs

- An ability to read a second major international language, or a language vital to a student's major research interest

- An oral comprehensive examination, primarily on the thesis or research essay and core seminar, to determine the candidate's ability to relate various disciplines to the study of international affairs.

English-speaking Canadian students are expected to develop proficiency in French.

Academic Standing

A grade of B- or better must be obtained in each course counted for credit towards the Master's degree. The school does not permit exceptions to this rule.

Career Planning

Students interested in continuing to doctoral programs should plan their programs to include courses in their discipline, if other than international affairs, which may be deemed necessary for their admission to doctoral programs. Interdisciplinary doctoral programs in international affairs are given in a number of institutions and the faculty can provide guidance in planning for these programs.

Recent experiences of students show that a strong background in research methods enhances job placement, and students may wish to take this into account in planning their course program. Part-time students are permitted to enrol in a maximum of two half-courses per term.

Students preparing for careers in international management should have taken before their M.A. year prerequisite courses to include the equivalent of Economics 100, Accounting 100, and statistics. In the school program, a student typically will take a core seminar; international enterprise analysis or international management; two specialized one-term courses with a thematic or regional focus; and a research essay. For international management electives, see graduate offerings in the School of Commerce, the School of Public Administration, the Department of Economics, and the Faculty of Administrative Studies at the University of Ottawa. See page 15 for reciprocal arrangements with the University of Ottawa.

School faculty can provide advice on careers in government, international governmental and non-governmental organizations, and in the private sector.

An increasing number of school graduates find employment in international programs in business and banking. Students planning careers in the private sector should choose their course electives in careful consultation with the school faculty.

Graduate Courses*

- International Affairs 46.500T2

International Integration

The study of political, economic, and social integration of nations, with particular emphasis on Western Europe.

Prerequisite: M.A. standing in the Norman Paterson School of International Affairs or permission of the school.

- International Affairs 46.505F1

International Dimensions in Development Studies

Issues in development financing, international trade, industrialization and technology transfer, food and natural resources, the role of international organizations.

*F, W, S indicates term of offering.

Courses offered in the fall *and* winter (or any other two terms) will be followed by T.

The number following the letter indicates the credit weight of the course: 1 denotes a half-course credit, 2 denotes a full-course credit, etc.

Prerequisite: M.A. standing in the Norman Paterson School of International Affairs or permission of the school.

- International Affairs 46.506W1

Agriculture and Rural Development

A study of the agricultural sector, rural areas and rural welfare in developing countries, including consideration of structural change in agriculture, agrarian reform, rural development strategies in various countries, and public policies affecting agriculture, activities ancillary to agriculture, rural industry, and public services.

Prerequisite: M.A. standing in the Norman Paterson School of International Affairs or permission of the school.

- International Affairs 46.507F1

Theories of Development and Underdevelopment

A comparative analysis of approaches to the study of development processes and underdevelopment, including structural-functional, neo-classical economic, Marxist, and dependency theories.

Prerequisite: M.A. standing in the Norman Paterson School of International Affairs or permission of the school.

- International Affairs 46.508W1

Development Planning: Theory and Practice

Third World development plans and strategies and their impacts; techniques employed in development planning, including social cost-benefit analysis, budgeting, problems in development administration.

Prerequisite: M.A. standing in the Norman Paterson School of International Affairs or permission of the school.

Students electing development studies as their core seminar will be required to complete two of the above courses numbered 46.505-46.508.

- International Affairs 46.510W1

Canada's International Policies: The Policy Making Process

A research seminar on the making, planning and evaluation of Canadian foreign policy. The seminar will adopt a team approach and focus on one issue area, such as law of the sea, trade, defence, international development, or Canada-U.S. relations.

- International Affairs 46.511W1

Canada's International Economic Policies
Canada's multilateral and bilateral economic relationships within the context of a changing world economic order since World War II. Includes policies affecting trade, capital flows, and international monetary relations. Students electing Canada's international policies as their core seminar will be required to complete both 46.510 and 46.511.

- International Affairs 46.515T2

Conflict Analysis
A study of contemporary theories of international conflict and conflict regulation, war and peace.
Prerequisite: M.A. standing in the Norman Paterson School of International Affairs or permission of the school.

- International Affairs 46.520F1

Studies in Strategy and Security
Selected topics in strategic theory and practice.

- International Affairs 46.521W1

Studies in Strategy and Security
Selected topics in strategic theory and practice.

- International Affairs 46.525W1

International Financial and Monetary Institutions and Policy
A selective, in-depth review of issues, such as balance of payments, adjustment processes, and the role of international financial and monetary institutions.

- International Affairs 46.526F1

Integration in Developing Countries

- International Affairs 46.530F1

International Enterprise: Analytical Approaches
The development of concepts and analytical approaches to the study of international enterprises and their impact on international affairs. Literature will be drawn primarily from economics, business, political science and law.

- International Affairs 46.531W1

International Enterprise: Applied Studies
The application of materials developed in 46.530 to a variety of selected policy issues, such as host and home country policies regarding international enterprises, extraterritoriality and the protecting of sovereignty, integration, international unionism,

East-West relations, north-south relations, technology transfer, producer cartels, international communications and cultural sovereignty, international codes of conduct.

Prerequisite: International Affairs 46.530.

- International Affairs 46.532F1

Science, Technology and International Affairs — Analytical Approaches
(To be taken by all students who intend to complete 46.532 in the winter term)

- International Affairs 46.533W1

Science, Technology and International Affairs — Applied Studies

- International Affairs 46.535F1

The Political Economy of East-West Relations

- International Affairs 46.536W1

Problems in the Middle East

- International Affairs 46.538F1

International Economics: Policy and Theory
An overview of international finance, trade, investment, and international aspects of economic development. Emphasis will be placed on policy analysis, and the underlying institutional context.

- International Affairs 46.540S1

International Development and International Organizations
A critical examination of the role of the UN and the specialized agencies in the promotion of international development programs.

- International Affairs 46.545F1

Conflict in Southern Africa

- International Affairs 46.546F1

Problems of Development in Latin America

- International Affairs 46.555F1

Problems of Development in South and South-east Asia

- International Affairs 46.556W1

Advanced International Legal Problems
(Also offered as Law 51.567)

- International Affairs 46.565W1

The International Economics and Politics of Resources

- International Affairs 46.566W1

Integration in Eastern Europe

- International Affairs 46.575F1

Rural-Urban Interaction in Africa

(Also offered as Geography 45.520)

- International Affairs 46.576W1

Ethical and Cultural Dimensions in Development Studies

Exploration of concepts of value, rights, duties, law, and obligation in relation to global development issues. Comparative analysis of major ideological and ethical foundations of regional cultures and the problems for cross-cultural and transnational relations.

- International Affairs 46.580S1

Future of the International System

Future trends in the international system emphasizing the impact of science and technology, changes in economic patterns and in communications.

Future policy options for Canada in a changing international system.

- International Affairs 46.588F1

International Political Economy

A seminar on the changing international division of labour and its consequences for world politics. Topics include differing patterns of industrialization, colonial relations, the role of the state, and current issues in international political economy.

Prerequisite: Work at a senior undergraduate level is required in at least two of the following: international relations, development studies, international trade, or political economy; (or permission of the school).

(Also offered as Political Science 47.588)

- International Affairs 46.591F1, W1, S1

Tutorials in International Affairs

To be chosen in consultation with the director.

- International Affairs 46.595F1, W1, S1

Research Workshop

This seminar focuses on the special problems of research design in the interdisciplinary field of international affairs, with materials drawn from both the established literature and the practice of leading members of the school's faculty.

- International Affairs 46.598F2, W2, S2

Research Essay

- International Affairs 46.599F4, W4, S4

M.A. Thesis

Selection of Courses

In addition to the graduate courses offered in the school, qualified students may choose from among courses in international affairs offered by related departments, schools and institutes. The following courses are particularly recommended:

Economics

43.511 Canadian Economy I

43.512 Canadian Economy II

43.531 Firms and Markets

43.532 Competition Policy

43.533 Regulation and Public Enterprise

43.536 Comparative Economic Systems I

43.537 Comparative Economic Systems II

43.546 Project Evaluation

43.555 Economics of Development

43.561 International Trade: Theory and Policy

43.562 International Monetary Theory and

Policy

43.581 Regional Analysis

Geography

45.537 Soil Resources

45.540 Explorations in Cultural, Political and Historical Geography

45.543 Selected Concepts in Cultural Geography

45.546 Geographical Insights into Canadian Problems

45.555 Tourism and International Development

History

24.535 Canada in the North Atlantic World, 1900-1939

24.536 Canada Between the Wars, 1919-1939

24.570 Seminar in British Imperial History

24.580 Problems in International History

Law

51.550 Canadian Constitution

51.553 Advanced Legal Problems of Federalism

51.563 International Law

Political Science

47.506 Problems of Canadian Government and Politics I

47.507 Problems of Canadian Government and Politics II

47.514 Comparative Communist Politics, Theory and Practice

- 47.515 Comparative Communist Politics,
Selected Aspects
- 47.516 Selected Problems in Soviet Politics
- 47.517 Selected Problems in African Politics
- 47.520 Nationalism
- 47.521 Multiculturalism
- 47.550 Problems in Western European Politics
- 47.560 Theory and Research in International
Politics
- 47.561 Canadian Foreign Policy
- 47.570 Advanced Research Methods
- 47.581 Foreign Policies of African States
- 47.585 Foreign Policy Analysis
- 47.587 Analysis of International Organization
- 47.589 Problems in International Politics

Public Administration

- 50.500 Public-Sector Managing and the
Canadian Political System
- 50.530 Organizational Behaviour I
- 50.531 Organizational Behaviour II
- 50.565 Government-Industry Policy Relations
- 50.566 Science and Technology Policies
- 50.568 Policy and Decision Making
- 50.572 Policy Seminar on Nuclear Policy

Sociology and Anthropology

- 53.507 Social Change and Economic Develop-
ment
- 53.512 Statistical Methods I
- 53.513 Statistical Methods II
- 53.520 Comparative Social Systems
- 53.525 Canadian Society
- 53.529 Sociology of Science and Technology
- 53.530 Social Institutions: Economy and Society
- 53.531 Social Institutions: Labour Processes
- 53.540 Political Sociology
- 53.545 Power and Stratification
- 53.585 Social Movements and Industrial Change

Soviet and East European Studies

- 55.500 Interdisciplinary Seminar on the Soviet
Union and Eastern Europe

Department of Law

The Department

Chairman of the Department: R.L. Campbell

Director of the Jurisprudence Centre: P.J. Fitzgerald

Although the Department of Law does not offer a program of studies leading to an M.A. degree in Law, it actively participates in such interdisciplinary graduate programs as those offered by the Norman Paterson School of International Affairs, the Institute of Canadian Studies, and the School of Public Administration. Members of the department also supervise graduate theses and research essays and provide graduate-level tutorials dealing with the legal aspects of various disciplines.

The Jurisprudence Centre, established by the department in 1974, is a forum for the advanced interdisciplinary study of problems related to law, law reform and policy.

Currently, the Department of Law offers seven courses at the graduate level.

A number of courses offered by the department at the senior undergraduate level form part of certain interdisciplinary graduate programs in such areas as public administration, international affairs, and Canadian studies. These courses are described in the undergraduate calendar.

Graduate Courses*

- Law 51.510F1

Advanced Problems in Legal Philosophy
Studies in legal theory and analyses of law advanced by Hart, Dworkin, and others; legal concepts: for example, principles, rights, duties, liability, etc. Precise course content will vary from year to year and will be announced at the beginning of the term.

Prerequisites: Law 51.311 (32.311) and Law 51.312 (32.312) or permission of the relevant department.

*F,W,S indicates term of offering.

Courses offered in the fall *and* winter (or any other two terms) will be followed by T.

The number following the letter indicates the credit weight of the course: 1 denotes a half-course credit, 2 denotes a full-course credit, etc.

(Also offered as Philosophy 32.510)

P.J. Fitzgerald and R.R.A. Marlin.

- Law 51.550F1

The Canadian Constitution

A highly concentrated half-course, designed to familiarize graduate students with the terminology, principles and doctrines of judicial interpretation of the B.N.A. Act and other constitutional statutes. The emphasis will be on the division of legislative powers in the Canadian federation. This course or its equivalent is a prerequisite for the course Advanced Legal Problems of Federalism (Law 51.553).

Prerequisite: Open only to graduate students in their Master's year who have not previously studied Canadian constitutional law. Graduate students at the Qualifying Year level are advised to consider registering in Canadian Constitutional Law (Law 51.450).

J.G. Neuspiel.

- Law 51.553W1

Advanced Legal Problems of Federalism

An advanced study of selected Canadian constitutional problems including constitutional revision. Some comparisons with other federal systems may be made.

Prerequisite: A course in Canadian constitutional law.

J.G. Neuspiel and others.

- Law 51.563F1

International Law

A highly concentrated half-course designed to familiarize graduate students with the terminology, principles and doctrines of the law of nations. This course or its equivalent is a prerequisite for all international law courses at the 500 level.

Prerequisite: Open only to graduate students in their Master's year who have not previously studied international law. Graduate students at the Qualifying Year level are advised to consider registering in Public International Law (Law 51.463).

J.G. Neuspiel.

- Law 51.567W1

Advanced International Legal Problems

In 1981-82 this seminar may involve an in-depth study of the law of treaties or the international law of peacekeeping.

Prerequisite: Law 51.463, 51.563 or equivalent, or permission of the department.

(Also offered as International Affairs 46.556)

J.G. Neuspiel and others.

- Law 51.590T2

Tutorials/Directed Readings in Law

Tutorials or directed readings in selected areas of law, involving presentation of papers as the basis for discussion with the tutor. A substantial requirement for the course may be participation in an advanced law course at the undergraduate level.

- Law 51.591F1, W1, S1

Tutorials/Directed Readings in Law

Tutorials or directed readings in selected areas of law, involving presentation of papers as the basis for discussion with the tutor. A substantial requirement for this course may be participation in an advanced law course at the undergraduate level.

Courses Not Offered in 1981-82

51.555 Administrative Law III

Department of Political Science

The Department

Chairman of the Department: R.J. Jackson
Departmental Supervisors of Graduate Studies:
M.S. Whittington and B.W. Tomlin

The Department offers programs leading to the M.A. and Ph.D. degrees. Specialized graduate study and research may be undertaken in the fields of political theory, Canadian government and politics, comparative government and politics, international relations, and public administration. Within these fields, students may select more specialized areas of concentration, such as classical, medieval and modern, or analytic and empirical theory, comparative government, and politics of a particular area or group of countries, such as Africa, Eastern Europe, or South and East Asia where the department has developed particular strength and resource materials.

Ottawa provides a wealth of resources, both in personnel and in research material, for the student of government, politics, public administration, and international relations. Carleton has specialized schools and institutes in interdisciplinary study in public administration, Canadian studies, international affairs, and Soviet and East European studies. In addition to the University facilities, Ottawa offers the graduate student in political science a host of study and research opportunities unparalleled in Canada. The Public Archives, the National Library, the Library of Parliament, the Supreme Court Library, the National Museums, and Statistics Canada are all located in Ottawa. The headquarters of many government departments, most federal government agencies, and a multitude of national organizations and trade associations are located in Ottawa; many maintain specialized libraries. Some of the embassies and diplomatic missions located in Ottawa maintain specialized libraries, and offer access to documents and other research materials.

be considered for admission to a Qualifying Year program. Candidates who complete the Qualifying Year with high second-class standing may be considered for admission to the Master's program the following year.

Refer to the general section of this Calendar for details of the regulations governing the Qualifying Year.

Master of Arts

Admission Requirements

The normal requirement for admission to the Master's programs is an Honours B.A. (or the equivalent) in Political Science, with at least high second-class standing.

Honours graduates in fields other than political science will be considered on the basis of their academic background and standing. Those with deficiencies may be required to take additional courses or to register in the Qualifying Year program.

Program Requirements

All Master's candidates will enrol in an approved number of courses in political science, including political theory and research methodology, if not already taken. No more than one of these courses may be taken at the 400 level.

Each candidate, in consultation with the department, will select and follow one of the following three optional program patterns:

- Five full courses (or the equivalent) in political science;
- Four full courses (or the equivalent) in political science, and a research essay on a topic related to one of the courses;
- Three full courses (or the equivalent) in political science, and a research thesis, equivalent to two full courses, in an approved field.

All Master's candidates in political science must also undertake a comprehensive oral examination on approved major and allied fields. Details of this examination are outlined below under comprehensive examination.

All candidates must normally demonstrate a reading knowledge of French. Students from

Qualifying Year Program

Applicants who have a general (pass) B.A. in Political Science, with second-class standing, may

abroad, whose mother tongue is other than English, or students whose research interests require another language, may obtain permission from the departmental graduate studies committee to substitute this language for French. Language tests are conducted twice a year, in October and February.

A supervisor will be assigned to each candidate to advise and assist in the preparation for the comprehensive and language examinations.

Comprehensive Examinations

All Master's candidates in political science must successfully pass an oral comprehensive examination, in a major field of concentration chosen from the following list:

- Political Theory
- Canadian Government and Politics
- Comparative Government and Politics
- International Relations
- Public Administration and Policy Analysis

The comprehensive examination will cover not only depth of knowledge of the literature in the field, but the relation of theory and research in that field of political science to an allied field in political science or, with the approval of the departmental graduate studies committee, a discipline related to political science. To prepare for the comprehensive examination, the student will pursue an approved program of courses related to his/her chosen field.

Academic Standing

All Master's candidates must obtain at least B standing (grade point average of 8.0). One grade of C+ may be allowed.

Doctor of Philosophy

The Ph.D. program in political science normally will be undertaken on a full-time basis. However, in cases of exceptional merit, the department will accept a few candidates for the degree on a part-time basis.

Admission Requirements

The normal requirement for admission to the Ph.D. program is a Master's degree (or its equivalent)

in political science, public administration, or international affairs, with at least high second-class standing. This normally will mean a Carleton equivalent grade point average of 9.5, taking into account both transcript and letters of reference.

Program Requirements

The normal program requirements for Ph.D. candidates are outlined in the general regulations section of this Calendar.

All students are required to have or to acquire an adequate basic knowledge of political theory and research methodology, regardless of their field of specialization. They will also be expected to undertake further work in statistics, if statistical proficiency is needed for the preparation of the thesis.

The specific program requirements for Ph.D. candidates in political science are the following:

- At least three graduate full courses (or the equivalent); a grade point average of at least 9.0 must be obtained in these courses before proceeding to the comprehensive examinations. Additional courses may be required for candidates whose background or standing is deficient.
- Political Science 47.690 and 47.695 (Ph.D. Tutorials)
- Proficiency in languages and/or research skills, as outlined below under language and research skill requirement
- Comprehensive examinations, as outlined below under comprehensive examinations
- A thesis, written in English or French, which must be defended in English at an oral examination; this examination may include material related to the general field of the thesis.

The completion of the Ph.D. program will normally require at least two years of full-time study beyond the Master's degree.

A supervisor and at least two other advisers will be assigned to each Ph.D. candidate to advise him/her on his/her studies. The student's entire program must be approved by the department.

Language and Research Skill Requirement

All Ph.D. candidates must demonstrate an ability to use two research skills appropriate to their program, one of which must be a language other than English.

Candidates, one of whose fields is Canadian government and politics, or whose thesis deals mainly with Canada, must demonstrate an ability to read and translate French easily as one of their skill requirements.

All other candidates must demonstrate an ability to read and translate easily a language appropriate to their program.

The second skill requirement may be fulfilled in one of the following ways:

- A demonstrated ability to read and translate easily a second language
- An oral knowledge of a language sufficient to conduct interviews in the language
- Satisfactory completion (B- or better) of *two* of Political Science 47.571: Research Design; Political Science 47.572: Applied Research Methods; Political Science 47.573: Advanced Research Methods.
- Credit work in an approved political science methodology workshop or colloquium.

The research skill requirement shall *normally* be satisfied before the thesis proposal defence.

Comprehensive Examinations

All Ph.D. candidates must undertake the following examinations:

- A written examination in two approved fields, covering general knowledge of the field and two approved areas of specialization in each field; an oral examination on the written material may be given at the discretion of the examining committee.
- A final oral comprehensive examination integrating the two fields.

The comprehensive examinations will normally be completed by the beginning of the seventh term of registration. Candidates will be expected to complete these examinations successfully before beginning the thesis. The fields of study for the Ph.D. examinations are to be chosen from the following list:

Political Theory

A general knowledge of the main outlines and significant themes and problems of political philosophy and thought, with emphasis on two of the following: classical (mainly Greek and Roman); modern (Machiavelli through the nineteenth century); contemporary (twentieth century); Canadian and American political thought and its immediate European background; current theories

and approaches to political analysis; methodology and theory construction.

Canadian Government and Politics

A general knowledge of Canadian political ideas, institutions, and processes, with emphasis on two of the following: federalism and the constitution; parliament and legislatures; parties, elections and interest groups; political culture and socialization; political economy; provincial government and politics; public administration and policy analysis (if not chosen as a sub-field under public administration and policy analysis); Canadian political thought and ideology (if not chosen as a sub-field under political theory).

Comparative Government and Politics

A general knowledge of the theories and methodology of comparative politics, with emphasis on one sub-field from each of the following two lists:

- Countries or areas: Western Europe; USSR and/or Eastern Europe; United States; Africa; or an approved combination of countries or areas.
- Topics or themes: political development and integration; political stability and change; federalism; legislatures; local government and politics; multiculturalism and the politics of ethnicity; political parties and interest groups; public opinion and voting behaviour; policy analysis.

International Relations

A general knowledge of international theory, international organization, and the development of the field of international relations, with specialization in two of the following: analytical international theory; comparative analysis of foreign policy (including a knowledge of a particular state or region); international integration and organization; conflict analysis; international political economy.

Public Administration and Policy Analysis

A general knowledge of theory and of practice in Canada, Britain and the United States, with emphasis on two of the following topics: theories of administration, organization, comparison and policy analysis; Canadian public administration and policy analysis (including some knowledge of provincial and municipal levels); comparative public administration (with reference to either developing or developed countries, or an approved

combination of countries); administrative responsibility (including judicial controls).

Selection of Courses

Within the scope of the regulations, the following undergraduate courses (fully described in the *Carleton University Undergraduate Calendar*) may be taken by graduate students.

Political Science

- 47.400 Topics in Canadian Government and Politics
- 47.401 Policy Making in Canada
- 47.402 Policy Seminar: Problems of Northern Development
- 47.403 Politics and the Media
- 47.404 Interest Groups in Canadian Politics
- 47.405 Federalism
- 47.406 Legislative Process in Canada
- 47.407 The Politics of Law Enforcement in Canada
- 47.408 National Security and Intelligence in the Modern State
- 47.409 French-Canadian Politics
- 47.412 Society and Politics in Liberal Democracies
- 47.413 The State in Advanced Capitalist Societies
- 47.414 Theory and Practice in Third World Development
- 47.415 Selected Problems in Third World Development
- 47.420 Policy Making in the United States
- 47.421 Politics of Influence in the United States
- 47.422 Constitutional Politics
- 47.430 Concepts of the State
- 47.431 Marxist Thought
- 47.432 Contemporary Marxism
- 47.435 The Conflict of Ideas in Contemporary Society
- 47.446 Theories of Public Administration
- 47.447 Decision Theories and Policy Studies
- 47.448 Public Organizations: Theory and Practice
- 47.460 Analysis of International Relations
- 47.461 Soviet Foreign Policy
- 47.466 American Foreign Policy
- 47.467 International Politics of North America
- 47.470 Political Research Design and Data Analysis

47.482 International Politics of Africa

47.483 Foreign Policies of Major East Asian Powers

Students are encouraged to look at the course offerings of the Departments of Sociology and Anthropology, and Economics; the Schools of International Affairs, Journalism, Public Administration and Social Work; and related disciplines at Carleton.

Except where an M.A. student is permitted to take an allied field in another discipline, a graduate student will normally take no more than one course in another department, school or institute, in fulfilment of the M.A. or Ph.D. requirements.

Graduate Courses*

- Political Science 47.500F1

Canadian Local Government and Politics
A research seminar on selected problems.

- Political Science 47.501W1

Canadian Provincial Government and Politics
A research seminar on selected problems.

Prerequisite: Political Science 47.200 or permission of the department.

- Political Science 47.502W1

Comparative Local Government
A seminar on the systems of local government in the United States, Britain and France (which have provided prototypes for many other countries), and systems in other countries, chosen according to the interests of the students.

- Political Science 47.503

Political Parties in Canada

A seminar on political parties and party systems in Canadian federal politics, including an examination of patterns of historical development, party organization and finance, relationships with social movements, and the impact of Canadian federalism.

*F, W, S indicates term of offering.

Courses offered in the fall and winter (or any other two terms) will be followed by T.

The number following the letter indicates the credit weight of the course: 1 denotes a half-course credit, 2 denotes a full-course credit, etc.

- Political Science 47.505T2

Comparative Government

A research seminar dealing in the fall term with theories, methods and problems of comparison, and in the winter term with particular themes.

- Political Science 47.506F1

Problems of Canadian Government and Politics I

A research seminar on selected problems. In 1981-82 this seminar will deal with political parties, especially party organization, finance, patronage, the relationship between parliamentary and extra-parliamentary party structures, the impact of federalism, and the political economy of party politics.

- Political Science 47.507W1

Problems of Canadian Government and Politics II

A research seminar on selected problems.

- Political Science 47.508F1

The Politics of Energy and the Environment

A research seminar focusing upon the substantive issues, the policy structures and processes, and current Canadian governmental response in the area of energy policy and environmental quality management.

- Political Science 47.509

Canadian Political Economy

A seminar on political economy as a traditional and contemporary approach to the study of Canadian politics. The theoretical bases of this approach will be discussed, as will the controversies generated in its examination of the relationship between the Canadian state and international and domestic capitalism. Specific topics will range from the staple thesis and the national policy, to the hinterland perspective on Western Canada, and to the contemporary literature on dependency, class, and state.

- Political Science 47.510T2

The Political Process in Canada

An analytical study of the democratic political process, with particular reference to political parties and elections, pressure groups, and political leadership in Canada.

- Political Science 47.511

Canadian Federalism

A study of the evolution and contemporary operation of the Canadian federal system, noting parti-

cularly the specific social, political, economic, and structural features which underlie its operational performance, its resilience in crisis and its potential for adaptation.

- Political Science 47.514F1

Comparative Communist Politics: Theory and Practice

Examination and analysis of basic models of communist political systems, with emphasis on problems of systemic change and adaptation (inclusive of Soviet, East European and Asian systems and Cuba).

Prerequisites: Political Science 47.320 and 47.215 or 47.312, or permission of the department.

- Political Science 47.515W1

Comparative Communist Politics: Selected Aspects

Examination and analysis of selected aspects of communist political processes, such as integration, elite formation, leadership and succession, and decision making. The emphasis will change from year to year.

Prerequisite: Political Science 47.514 or permission of the department.

- Political Science 47.516W1

Selected Problems in Soviet Politics

A seminar on selected aspects of the Soviet political system with special attention to the inter-relationship among politics, culture, and society in the USSR.

Prerequisites: Political Science 47.100, 47.320 and 47.432 or permission of the department.

- Political Science 47.517F1

Selected Problems in African Politics

A political economy approach will be taken in this seminar, stressing the relationship of dependence, underdevelopment, participation, and class formation to the decision-making process in selected countries.

- Political Science 47.518

State, Revolution, and Reform in East Asia

Problems of state-building, political institutions and policy making in the sinic world, including the People's Republic of China, Taiwan, Japan, North and South Korea, Singapore, and Vietnam.

Prerequisite: Political Science 47.312 or permission of the department.

- Political Science 47.520F1

Nationalism

A seminar on the historical and comparative study of nationalism, with emphasis on its role in the promotion of political change.

- Political Science 47.521W1

Politics in Plural Societies

A seminar on politics in multicultural societies, with emphasis on Canada and other developed democracies. Topics will include structural segmentation, consociational processes, intergroup attitudes, and institutional adjustments to pluralism.

- Political Science 47.525F1

Problems in American Government I

A research seminar on topics such as the distribution of power, decision-making processes, the impact of technology, strains in intergovernmental relations, civil-military relations, governmental news management and secrecy; executive accountability, and impediments to reform of Congress and the presidency.

- Political Science 47.526W1

Problems in American Government II

A research seminar on topics such as political violence and social change, the roles of mass media, business elite roles, political corruption, civil rights and minority politics, and the urban crisis.

- Political Science 47.530T2

Political Theory

An intensive examination of the major questions in classical, medieval, modern and contemporary political philosophy. This political theory course is both historically comprehensive in scope and thematically oriented in depth. There is a coordinator for the course, but as various topics are dealt with, others who possess expertise in the specific area conduct the seminars.

- Political Science 47.531F1

Modern Political Culture and Ideology

Analysis of the meaning of political culture, its various forms, and their differential implication for politics; problems of conceptualization and method; the contributions of leading approaches. Topics include myth, utopia and ideology, time and space, power and authority.

(Offered alternate years with 47.532)

- Political Science 47.532W1

Democratic Theories

Analysis of various democratic theories, from classical to modern, including a contemporary democratic theory of labour-managed systems applicable to welfare, liberal and socialist states. (Offered alternate years with 47.531)

- Political Science 47.533F1

Inquiries in Political Philosophy

A seminar dealing with topics such as critical theory, obligation and disobedience, historicism and nihilism, and the critique of modernity. (Offered alternate years with 47.534)

- Political Science 47.534W1

Analytical Political Theory

The role of theory in the study of politics and the major concepts used in political analysis. The possibilities and limitations of the historical, institutional, positivist, functional and behavioural approaches will be emphasized. (Offered alternate years with 47.533)

- Political Science 47.535T2

The Canadian and American Political Traditions

A seminar on the interpretation of the American, English-Canadian and French-Canadian political traditions, with emphasis on their comparative development.

- Political Science 47.540T2

Canadian Public Administration and Policy Analysis

This course is intended to offer to the student the opportunity for an intensive examination of policy processes and institutions in Canada, as well as more general theory and practice of public administration in this country.

- Political Science 47.544F1

Public Administration in Developed Western Countries

A seminar in comparative public administration, with emphasis on Commonwealth countries, the USA, France, and West Germany.

- Political Science 47.545W1

Public Administration in Developing Countries

A seminar on the literature and characteristics of development administration; comparison by region, country, and topic.

- Political Science 47.546T2

Theories of Public Administration

A seminar on theories of bureaucracy, organization, and comparison.

- Political Science 47.547T2

Decision Theories and Policy Studies

This course will cover decision making and policy studies in a non-mathematical way from two complementary angles: basic philosophy, psychology, and theory of individual and group decision making, and overall policy analysis as pursued by Vickers, Dror, and others, with a brief look at tools of decision making.

- Political Science 47.548

Research Seminar in Public Administration I

The content of this seminar will vary from year to year according to faculty research interests and student demand. For 1981-82, the seminar, if offered, will deal with policy making in developing countries.

- Political Science 47.549

Research Seminar in Public Administration II

The content of this seminar will vary from year to year according to faculty research interests and student demand. For 1981-82, the seminar, if offered, will deal with administrative responsibility.

- Political Science 47.550T2

Problems in Western European Politics

This course will deal intensively with politics in Britain, France, Germany, Italy, and selected minor European powers both democratic and authoritarian.

- Political Science 47.560T2

Theory and Research in International Politics

An examination of the principal problems in contemporary international relations theory and research, emphasizing the state of the field and current directions in it.

Prerequisite: Political Science 47.460 or permission of the department.

- Political Science 47.561F1

Analysis of Canadian Foreign Policy

A research seminar on contemporary Canadian external policies, with emphasis on the analysis of cases and issues, and comparisons with other national actors.

Prerequisites: Political Science 47.260 and 47.366, or permission of the department.

- Political Science 47.570T2

Basic Research Methods

A half-course for graduate students with no background in research methods. Content: basic statistics and applications.

- Political Science 47.571

Research Design

A seminar in research design, including data collection and data analysis. This course will teach students to construct research designs with two foci: the traditional academic investigation of theoretical problems, and the emerging field of public policy analysis and evaluation research.

Prerequisite: Political Science 47.570 or permission of the department.

- Political Science 47.572

Applied Research Methods

A half-course on problems of applying research methods to substantive problems. Topics will include adjusting designs to account for changed conditions in the field; overcoming barriers to data collection; and interpreting the results of data analysis. The course will proceed by examining completed research projects in various sub-fields, and applying the conclusions reached to students' research plans. Intended for students planning to engage in research in the immediate future.

Prerequisite: Political Science 47.570 or permission of the department.

- Political Science 47.573

Advanced Research Methods

A half-course in advanced techniques of analysis. The focus of this research seminar is on the use of various mathematical and statistical techniques in the construction and analysis of political theory. The seminar may include such topics as the translation of verbal theory into formal theory, the use of statistical techniques beyond regression and correlational analysis to examine political hypotheses, and index construction, including scaling, and validation techniques.

Prerequisite: Political Science 47.570 or permission of the department.

- Political Science 47.581W1

Foreign Policies of African States

The foreign policy determinants and international behaviour of African states. Each year, the seminar will focus on a particular issue area.

- Political Science 47.585W1

Foreign Policy Analysis

A research seminar dealing with selected problems in the study of foreign policy formulations and outcomes.

Prerequisite: Political Science 47.460 or permission of the department.

- Political Science 47.586W1

Strategy

A research seminar on the analysis of recent western as well as Soviet and Chinese strategic concepts, civilian-military relations, defence policy, decision making, and arms control and disarmament.

- Political Science 47.587F1

Analysis of International Organization

A research seminar on process and change in contemporary forms of international organization.

Prerequisite: Political Science 47.360 or permission of the department.

- Political Science 47.588F1

International Political Economy

A seminar on the changing international division of labour, and its consequences for world politics. Topics include differing patterns of industrialization, colonial relations, the role of the state and current issues in international political economy.

Prerequisite: Work at a senior undergraduate level is required in at least two of the following: international relations, development studies, international trade or political economy; (or permission of the department).

(Also offered as International Affairs 46.588)

- Political Science 47.589F1

Problems in International Politics

A workshop on significant issues in the study of international politics with emphasis on the state of the field (and sub-fields) and problems in research.

Prerequisite: Political Science 47.560 or permission of the department.

- Political Science 47.590T2

Tutorial in a Selected Field

Tutorials or reading courses on selected topics may be arranged with the permission of the department.

- Political Science 47.591F1, W1, S1

Tutorial in a Selected Field

Tutorials or reading courses on selected topics may be arranged with the permission of the department.

- Political Science 47.594F1, W1, S1

M.A. Comprehensive Tutorial

Tutorial designed as preparation for the M.A. comprehensive examination, under the direction of members of the department. The grade to be awarded will be that obtained on the comprehensive examination.

- Political Science 47.598F2, W2, S2

Research Essay

Tutorial for students who write a research essay rather than a thesis.

- Political Science 47.599F4, W4, S4

M.A. Thesis

- Political Science 47.690T3, 47.695T3

Ph.D. Tutorials

Ph.D. tutorials specifically designed as intensive preparation for the field examinations, under the direction of one or more members of the department. The grade to be awarded will be that obtained on the field examination.

- Political Science 47.691T1, 47.692T1

Ph.D. Tutorials (half-courses)

Ph.D. tutorials specifically designed as intensive preparation for the minor field examinations, under the direction of one or more members of the department. The grade to be awarded will be that obtained on the field examinations. (Registration is limited to students who entered the Ph.D. program prior to 1976-77.)

- Political Science 47.699F10, W10, S10

Ph.D. Thesis

Ph.D. students in political science at Carleton may also seek supervision from the faculty of related

schools and departments, particularly the School of Public Administration, the Norman Paterson School of International Affairs, the School of Journalism and the Departments of Economics and Sociology and Anthropology.

The Department

Chairman of the Department: W.G. Webster
Departmental Supervisor of Graduate Studies:
B.A. Pappas

The Department of Psychology offers programs of study and research leading to the degrees of Master of Arts and Doctor of Philosophy, on a full-time and part-time basis. Financial support is competitive, however, and usually limited to full-time students.

The course of study in the department is strongly research-oriented, although practical courses, such as quantitative methods, testing, and behaviour modification are available. In addition, students at the doctoral level are encouraged to qualify for summer internship and practical experience programs in one of the applied settings approved by the department.

Research in the Department of Psychology covers two basic fields: the life sciences areas of physiology and biopsychology, animal learning, sensory and perceptual processes, human learning, and psychophysiology; and social science areas, such as social and developmental psychology and the history of psychology. Research projects are also under way in unique subareas, such as the psychology of early childhood, developmental biopsychology (the study of neurophysiological correlates of growth), human neuropsychology, and human perception and performance.

Although these different areas of specialization exist in the department, there is considerable overlap in interests among the faculty which becomes evident in graduate training and research programs. Applicants are encouraged to write directly to faculty members for more specific details on research interests and projects currently underway.

The range of course and research offerings available to graduates is further extended by agreements with other departments at Carleton and with the University of Ottawa. These make it possible for students to take courses outside the psychology department for credit towards the M.A. and Ph.D. degrees.

Interaction with faculty and other graduate students is an important part of graduate training. Well-equipped laboratories, both on the campus

and elsewhere, also constitute an essential resource for graduate training.

Physiological research support facilities include a histology laboratory; a neurochemical assay laboratory; a vivarium for small animals; a surgery facility; and individual laboratories of faculty whose interests fall into the physiological area.

Human psychophysiological research facilities include fully-equipped laboratories for the analysis of behavioural and electrophysiological correlates of sleep; the psychophysical and electrophysiological analysis of sensory processes in humans; the study of perceptual and decision processes in humans; the interaction between humans and computers; the evaluation of human performance relating to learning and to memory; systematic study of cognitive development in children, including a preschool maintained and operated by the department; and studies on hypnosis.

Laboratories for social psychological research on human communication, decision processes, and a variety of other topics are also found within the department.

The Department of Psychology receives excellent technical support from the Carleton University Science Workshops, where design and manufacture of special-purpose apparatus is carried out. In addition, the workshops provide technical support for the more than 15 computer systems currently in use in laboratories throughout the department.

Graduate students have access to the Xerox Sigma 9 and Honeywell Level 66 computer systems, supported by the Computing Services division of the university. These systems support a variety of computer languages, including FORTRAN, APL, PASCAL, and BASIC, several microcomputer emulatory programs, a variety of statistical and mathematical packages, such as the BMDP and SPSS systems, and a long list of other programs.

The Department of Psychology also has several unique liaisons with research facilities throughout the capital region. These enable faculty and graduate students to carry out collaborative research projects with scientists whose interests overlap with those of the department. Examples include Health and Welfare Canada, the Ministries of Justice, Transport, and Communication, local hospitals, Bell Northern Research, and various laboratories within the National Research Council of Canada.

All graduate students in psychology are expected to conduct research of interest to them during each year of graduate study. This requirement may be satisfied by independent research, serving as a research assistant, or by doing pilot or thesis research.

Each year, the candidate's adviser submits a written critique of research progress, and this becomes part of the candidate's permanent record. Qualifying Year students are evaluated at the end of the first 12 months. In addition to research activity, candidates may be required to serve as teaching assistants.

Depending on his/her field of concentration, a candidate may be required to demonstrate an ability to read with understanding relevant technical material in a foreign language and/or to give satisfactory evidence of competence in such areas as computer techniques, electronic instrumentation, psychometrics, sampling procedures, or surgical techniques.

All graduate students are required to demonstrate competence in statistical and quantitative methods through successful completion of Psychology 49.545 (with a grade of B- or better) or a qualifying open-book examination, which is ordinarily scheduled during the first part of September, just prior to the registration period, and which encompasses the material covered in Psychology 49.545. In the event of successful completion of the examination, another course is substituted for Psychology 49.545. In the case of M.A. students, the department may recommend that a grade of C or C+ in Psychology 49.545 be acceptable for credit (see page 18 of the general regulations) only after successful completion of the qualifying examination. This option is limited to those who pass the exam within two successive offerings of it, and who maintain continuous registration as a graduate student between the first registration in Psychology 49.545 and the taking of the exam.

The department may recommend that a graduate student be asked to withdraw from the program at any time if his or her progress in course work, research, or comprehensive examinations proves unsatisfactory.

Qualifying Year Program

Occasionally, candidates with exceptional promise who offer less than Honours B.A. status may be admitted to a Qualifying Year program, approved by the graduate studies committee, and designed to prepare them for Master's study. A minimum grade of B- must be obtained in each Qualifying Year course, and candidates may be required to complete satisfactorily the equivalent of an Honours B.A. thesis.

Master of Arts

Admission Requirements

The normal requirement for admission into the Master's program is an Ontario Honours B.A. with high second-class standing (or its equivalent) with credit in the following areas: statistics and design of experiments; experimental psychology; learning or motivation; physiology and/or comparative psychology; history and/or systems; and two or three additional courses in psychology. Consideration will also be given to candidates whose background lies in an area other than psychology.

Candidates with particular course deficiencies may be required to register in additional courses at Carleton.

Scores on the Graduate Record Examination are required at the time of application.

Program Requirements

The Master's program usually consists of three full courses (or the equivalent), of which at least two must be at the graduate level (numbered 500 or higher), and a thesis (equivalent to two full courses) which must be defended at an oral examination. Psychology 49.545, its equivalent or the successful completion of the opting-out examination in quantitative methods is required of all graduate students. In the latter instance, another course is substituted for 49.545.

Academic Standing

A grade of B- or better is normally required in each of the courses counted for credit towards the M.A. degree. The department is prepared on occasion to recommend to the dean that a candidate be allowed a grade of C+ or C (but not C-) in one full course or each of two half-courses. In the case of Psychology 49.545, such a recommendation will be based on successful completion of the qualifying examination. This option is limited to those who pass the exam within two successive offerings of it and who maintain continuous registration as a graduate student between the first registration in Psychology 49.545 and the taking of the exam.

Doctor of Philosophy

Admission Requirements

The requirements for admission to Ph.D. programs are outlined in the general section of this calendar.

The Ph.D. program in Psychology normally will be undertaken on a full-time basis. However, in cases of exceptional merit, the department will accept a few candidates for the degree on a part-time basis. A Ph.D. candidate who enters the part-time program will normally be required to be registered as a full-time student for a minimum of three terms, at least two of which are consecutive.

Scores on the Graduate Record Examination are required at the time of application.

Applicants should note that of the B.A., M.A., and Ph.D. degrees in Psychology, only two may ordinarily be taken at Carleton University.

Program Requirements

The minimum program requirements for the Ph.D. degree in Psychology are as follows:

- 10 full course credits with a minimum grade of B- in each course
- Psychology 49.545, its equivalent, or the successful completion of the opting-out examination in quantitative methods is required of all graduate students. In the latter instance, another course is substituted for 49.545.
- A thesis equivalent to four of the required 10 course credits will be required for concentration in the history of psychology. Ordinarily, in the other

areas of psychology the thesis will be offered in fulfilment of five of the required 10 credits.

- A major area of specialization must be selected in which not less than six nor more than seven and one-half full course credits (including the thesis) may be offered in fulfilment of the 10-course requirement.

Comprehensive Examinations

All Ph.D. candidates are required to pass written and oral examinations in their area of specialization. There are two optional forms for the written comprehensive examination: two major essays, or one major essay and one research grant proposal. The submission of each essay or grant proposal will be followed within one to three weeks by a comprehensive oral examination, which is not restricted to issues raised by the written portion.

Ordinarily, the comprehensive examinations must be completed successfully before the Ph.D. prospectus meeting is scheduled. One oral defense must occur within four calendar terms of the student's initial registration in the Ph.D. program; the second must be defended within six calendar terms of initial registration.

Graduate Courses*

- Psychology 49.510F1
Research Methods in Social Psychology I
Experience with research and data analysis techniques of particular relevance for social psychology, such as sampling, attitude scaling, and measurement. Normally required of students writing a thesis in social psychology.
- Psychology 49.511W1
Research Methods in Social Psychology II
Current ethical and methodological issues in social psychological research, such as experimental effects, deception, and subject variables. Nor-

*F,W,S indicates term of offering.

Courses offered in the fall *and* winter (or any other two terms) will be followed by T.

The number following the letter indicates the credit weight of the course: 1 denotes a half-course credit, 2 denotes a full-course credit, etc.

normally required of students writing a thesis in social psychology.

- Psychology 49.523F1

Seminar in Physiological Psychology I

Selected classical and contemporary issues in physiological psychology, with emphasis on perceptual and motor processes. Normally required of students writing a thesis in physiological psychology.

- Psychology 49.524W1

Seminar in Physiological Psychology II

Selected classical and contemporary issues in physiological psychology, with emphasis on motivation, emotion and learning. Normally required of students writing a thesis in physiological psychology.

- Psychology 49.530W1

Perceptual Processes

Theoretical and empirical issues and implications of the area of perception, with attention to psychophysics, information processing, physiological mechanisms, and the ontogeny of perception.

- Psychology 49.545T2

Quantitative Psychology

The application of selected statistical techniques in psychology, including basic hypothesis testing, analysis of variance, multiple linear regression, nonparametric techniques, and multivariate analyses. Extensive use is made of computer statistical packages.

- Psychology 49.546F1

Advanced Methodology

An in-depth exposure to various methodological and statistical problems related to students' chosen areas of specialization; to examine in detail and gain experience with various statistical programs, such as SPSS.

Prerequisite: Computing Science 95.101.

- Psychology 49.547F1

Tests and Measurements

The administration and use of representative psychological tests.

Prerequisite: Psychology 49.330.

- Psychology 49.551F1

Developmental Psychology I

A detailed examination of selected issues in developmental psychology.

- Psychology 49.552W1

Developmental Psychology II

A continuation of 49.551.

- Psychology 49.561W1

Contemporary Research in Personality

Current controversial issues in personality research, and selected theoretical and research studies in personality.

- Psychology 49.570F1

Research Methods in Learning

Methods, research design, and instrumentation in the fields of learning and retention, with emphasis on response definition and measurement, procedures for monitoring the learning process, and problems of control.

- Psychology 49.573W1

Human Learning

A discussion of selected topics within the area of human learning.

- Psychology 49.575F1

Behaviour Modification I

The basic principles of learning as they apply to the modification of behaviour, with emphasis on application, ethics, research and methodology.

- Psychology 49.576W1

Behaviour Modification II

Special problems, topics, and projects related to behaviour modification.

Prerequisite: Psychology 49.575.

- Psychology 49.580F1, W1, S1

Special Topics in Psychology

The topics of this course will vary from year to year, and will be announced in advance of the registration period.

- Psychology 49.590F1, W1, S1

Directed Studies

An investigation in depth of selected problems in psychology by means of directed library research. Registration is restricted, permission to register being granted only by the graduate committee. A final report must be filed in the departmental office prior to submission of course grade.

- Psychology 49.591F1, W1, S1

Independent Research

Permission to register and approval of research plan must be obtained from the graduate com-

mittee. A final research report must be filed in the departmental office prior to submission of course grade. The course may be repeated for credit.

- Psychology 49.599F4, W4, S4

M.A. Thesis

- Psychology 49.600F1

Systems of Psychology

Historical research methods on the study of psychological movements and problems of the late nineteenth and early twentieth centuries; may be repeated for credit.

(Open with permission to advanced undergraduates)

- Psychology 49.601W1

Problems in the History of Psychology

A study of one or more selected topics in the history of man's attempt to understand his own nature; may be repeated for credit.

(Open with permission to advanced undergraduates)

- Psychology 49.603

Observation, Description and Explanation in Psychology

Problems of communication, concept formation, and exploration in the biosocial sciences are discussed. The interplay of facts, methods, models, theories and the human values which these serve are also explored.

- Psychology 49.610F1

Research Seminar in Social Psychology I

- Psychology 49.611W1

Research Seminar in Social Psychology II

- Psychology 49.612F1

Experimental Hypnosis

Selected issues in the study of experimental hypnosis will be critically reviewed. The problem of hypnotic susceptibility and its correlates will be given particular attention. Relationships among hypnotic phenomena, meditation, and behaviour therapy will be evaluated.

- Psychology 49.620F1

Research Seminar in Physiological Psychology I

- Psychology 49.621W1

Research Seminar in Physiological Psychology II

- Psychology 49.626F1

Comparative Psychology

Varied and acquired adaptive mechanisms and their phylogenesis. Topics will include attachment behaviour, social organization, learning abilities, communication and motivation.

- Psychology 49.650F1

Research Seminar in Developmental Psychology I

- Psychology 49.651W1

Research Seminar in Developmental Psychology II

- Psychology 49.661F1

Seminar in Human Neuropsychology I

A broad and intensive consideration of selected topics in human neuropsychology, integrating findings from psychology with related medical literature.

- Psychology 49.662W1

Seminar in Human Neuropsychology II

(Same description as 49.661)

- Psychology 49.663F1

Seminar in Human Neuropsychology III

(Same description as 49.661)

- Psychology 49.664W1

Seminar in Human Neuropsychology IV

(Same description as 49.661)

- Psychology 49.665F1

Comparative Neuropsychology

An examination, from a comparative perspective, of research and logic associated with the study of brain-behaviour relations. The objective of the course is to provide a background and orientation for evaluating infra-human research of brain-behaviour relations, and for relating such research to problems of human neuropsychology.

W.G. Webster.

- Psychology 49.666W1

Human Communication Disorders

The course provides an overview of normal and abnormal functions of the auditory system, particularly as it relates to the perception of human speech sounds. Diagnosis of clinical syndromes will be covered.

- Psychology 49.667W1

Developmental Psychopharmacology

The synthesis and metabolism of various neurotransmitters are detailed with respect to their role in behaviour modulation. The ontogeny of these systems is considered, as are behavioural changes which occur as a consequence of aberrant neurochemical activity.

(Open with permission to advanced undergraduates)

- Psychology 49.670F1, W1

Research Seminar in Learning

- Psychology 49.680F1, W1

Special Topics in Psychology

(Same description as 49.580)

- Psychology 49.690F1, W1, S1

Directed Studies

(Same description as 49.590)

- Psychology 49.691F1, W1, S1

Independent Research

(Same description as 49.591)

- Psychology 49.699F, W, S

Ph.D. Thesis

Through inter-university co-operation in graduate instruction, full-time graduate students registered in the Department of Psychology may enrol in one course at the University of Ottawa.

The School

Director of the School: G.B. Doern

Supervisor of Graduate Studies: Eugene Swimmer

The School of Public Administration was established in 1953 through the assistance of a generous grant from the Atkinson Charitable Foundation.

The school offers two graduate programs of study and research in the field of administration. Prospective applicants are urged to evaluate these two opportunities carefully in order that they may select the one most suitable to their interests, background and academic qualifications.

Diploma in Public Administration (D.P.A.)

This diploma program, which consists of five full courses or the equivalent, is more fully described below. It is designed to offer those persons in (or planning to enter) administrative careers an opportunity to begin acquiring some introductory exposure to subject matter related to administrative studies.

Master of Arts

The M.A. program is designed to provide a balanced exposure to both administrative studies and public policy. It is more fully described on the following pages.

Inquiries and requests for further information should be directed to the school.

Graduate Diploma in Public Administration

The Diploma in Public Administration is designed to offer those persons in, or planning to enter administrative careers an opportunity to begin acquiring some introductory exposure to subject matter related to administrative studies. The program consists of five courses and may be taken on a part-time, full-time, or mixed part-time and full-time basis.

The program is based on the recognition that persons with widely varying backgrounds will enter it. Students who successfully complete the D.P.A. program may apply for admission to the M.A. program, at which time they will be con-

sidered for admission along with all other applicants. If all of the first-year courses are not taken as part of the D.P.A., they will be required in addition to the final M.A. courses.

Admission Requirements

Admission to the graduate program in public administration is selective. To be considered for admission, an applicant must have a Bachelor's degree with at least high second-class standing from a recognized university, and must have completed courses in introductory economics (Economics 43.100 or 43.101, or the equivalent) and Canadian government and politics (Political Science 47.200 or equivalent). If an applicant has not completed the economics and political science prerequisites, they must be completed in addition to the student's program, with a grade of C or better. All students who have completed the prerequisites (particularly if completed several years ago) will be expected to have a working knowledge of the material in these courses.

Program Requirements

The program consists of five full course credits, at least four of which must be completed at Carleton. Advanced standing may be granted in one full course (or equivalent) if previous work is judged to be equivalent to courses required in the program. A student who has taken one (or more) of the other required courses prior to admission must substitute another course (or courses) in consultation with the director. In the event that a part-time student is required by his/her employer to move away from Ottawa, he/she may apply to complete one full course or the equivalent at another university, provided that no transfer of credit was granted on admission.

Students are required to complete any five full courses from the following program:

- Administration 50.510: Management Accounting and Administration, and Administration 50.511: Financial Management
- Administration 50.522: Economics for Management and Policy I, and Administration 50.523: Economics for Management and Policy II
- Administration 50.530: Organizational Behaviour I, and Administration 50.531: Organizational Behaviour II

- Administration 50.536: Law of Public Authorities I
 - Administration 50.500: Public-Sector Managing and the Canadian Political System
 - Administration 50.567: Public Sector - Private Sector Relations
 - Administration 50.568: Policy and Decision Making
 - Administration 50.550: Quantitative Methods
- Part-time students already admitted to the D.P.A. program under the provisions of previous calendars may adjust their programs to take advantage of the revised program outlined above.

Academic Standing

All candidates are required to obtain a grade of B- or better in each course in the program. A candidate may, with the recommendation of the school and the approval of the Faculty of Graduate Studies and Research, be allowed a grade of C+ in one half-course.

Master of Arts

The Master's program is specifically designed to provide the prospective and the mid-career administrator with a balanced exposure to administrative studies and to public policy.

The contemporary manager or administrator is increasingly required to be both a policy adviser and formulator and to have a substantive understanding of the many disciplines and variables associated with the decision-making process in contemporary organizations. University programs can begin to provide some of the foundations that will enable persons to acquire an understanding of the broad financial, legal, economic, political and social interrelationships that affect decisions in any organization.

The program is designed to prepare students for managerial, policy and managerial-support roles in the public services of Canada (federal, provincial, regional and municipal), and to accelerate and enrich the education and the development of those already performing such roles. Because it is conducted in conjunction with and draws upon a program of advanced research in administrative studies and public policy, it is

also designed to meet the educational needs of those wishing to undertake graduate-level work in public policy and management, but who may not have a current commitment to public service careers.

Degree Schedules

The degree can be taken in one of three basic modes: full-time, part-time, or through a mixed part-time and full-time schedule:

- The Full-time Schedule

A full-time student can complete the program in two years (four academic terms), but typically may require a fifth (usually summer) term to complete the requirements, depending upon the amount of advanced standing granted for previous courses.

- The Part-time Schedule

A part-time student normally completes from two to four half-courses during the regular academic year, typically in evening courses. Certain courses are also available during the summer term. The duration of a part-time program normally varies from five to eight years.

- Mixed Part-Time and Full-Time Schedule

This schedule enables the student to alternate periods of full-time and part-time study. Typically, students will begin on a part-time basis but may study on a full-time basis for at least one semester. Such full-time study, which may commence in either the fall, winter, or spring term, is especially suitable for practising mid-career administrators as it facilitates a flexible sequence for study and normal work periods.

Admission Requirements

To be considered for admission, an applicant must have a Bachelor's degree or equivalent with at least high second-class standing from a recognized university, and must already have completed courses in introductory economics (Economics 43.100 or 43.101 or equivalent) and Canadian government (Political Science 47.200 or equivalent).

If an applicant has not completed the economics and political science prerequisites, they must be completed in addition to the student's graduate program, with a grade of C or better. All students who have completed the prerequisites (particularly if completed several years ago) will be expected to

have a working knowledge of the material in these courses.

The school also gives special consideration to mid-career applicants. To qualify for mid-career admission, applicants must have spent several years in one of the public services, or be performing managerial or related functions in a private-sector organization and have demonstrated excellence in their performance in these organizations. The student must also meet the admission requirements for entry to the graduate program.

The school's admission policy will, of course, be governed by the availability of graduate student space and the need to admit applicants from a variety of disciplines and backgrounds (for example, social sciences, humanities, law, engineering, science). Possession of the minimum admission requirements does not, in itself, guarantee acceptance.

Advanced standing may be granted for required courses only if previous work is judged to be equivalent to courses required in the program. Advanced standing and transfer of credit must be determined on an individual basis in consultation with the director, and must also be approved at the time of admission by the dean of the Faculty of Graduate Studies and Research. In general, a grade of B- or better is required in equivalent courses to obtain advanced standing.

Program Requirements

The M.A. program comprises 20 half-courses (or the equivalent).

Students generally begin their program with required courses; it is possible, however, to take a mixture of optional and required courses throughout both years, provided that the student has the necessary prerequisites for any specific options selected.

Required Courses

- Admin. 50.500: Public-Sector Managing and the Canadian Political System
- Admin. 50.510: Management Accounting
- Admin. 50.511: Financial Management
- Admin. 50.522: Economics for Management and Policy I
- Admin 50.523: Economics for Management and Policy II

- Admin. 50.530: Organizational Behaviour I
- Admin. 50.531: Organizational Behaviour II
- Admin. 50.536: Law of Public Authorities I
- Admin. 50.550: Quantitative Methods
- Admin. 50.567: Public Sector - Private Sector Relations
- Admin. 50.568: Policy and Decision Making

Students who have successfully completed the requirements for the Diploma in Public Administration and who are unable to continue their M.A. program may be awarded the diploma, provided that four full courses have been taken at Carleton University.

Optional Courses

- One half-course selected from Stream 1 listed below, and
- Two half-courses selected from Stream 2 listed below, and
- Five half-courses selected from any of the three streams listed below, *or*
- A thesis (equivalent to four half-courses) and two half-course options, *or*
- A research essay (equivalent to two half-courses) and four half-course options

It is expected that students will normally complete all the required courses before taking optional courses.

Stream 1 — Public Policy Analysis

Administration

- 50.501 Policy and Administration in Intergovernmental Relations
- 50.502 The Political Economy of Regulation
- 50.513 Budgeting and Decision Theory
- 50.565 Government-Industry Policy Relations
- 50.566 Science and Technology Policies
- 50.569 Advanced Policy and Decision Theory
- 50.570, 571, 572, 573 Policy Seminars
- 50.574 Urban Policy Analysis
- 50.575 Advanced Statistical Policy Analysis

Stream 2 — Public Management

Administration

- 50.512 Management Information Systems
- 50.514 Public-Sector Accounting and Finance

- 50.515 Management in the Public Service
- 50.516 Urban and Local Government Management
- 50.517 Public Management in Developing Countries
- 50.519 Management of Public Enterprise
- 50.520 Public-Sector Investment and Pricing
- 50.531 Organizational Behaviour II
- 50.537 Law of Public Authorities II
- 50.538 The Management of Provincial Government
- 50.562 Planning and Evaluation in Government I
- 50.563 Program Assessment Design
- 50.581 Staffing and Personnel Management
- 50.583 Problems in Organizational Change and Development
- 50.584 Industrial Relations and Public-Sector Collective Bargaining
- 50.585 Public-Sector Collective Bargaining

Stream 3 — Recommended Options Offered by other Carleton Departments and Schools and by the University of Ottawa*

Economics

- 43.505 Econometrics
- 43.511 Canadian Economy I
- 43.530 Industrial Policy
- 43.540 Public Finance
- 43.555 The Economics of Development
- 43.580 Urban Analysis

History

- 24.433 Selected Problems in the Social and Political Development of Twentieth-Century Canada
- 24.438 Selected Problems in Canadian Labour History, 1873-1956

Journalism

- 28.434 Media and Society I
- 28.435 Media and Society II
- 28.462 Public Issues in Canada
- 28.532 Press and Government

Law

- 51.441 Labour Law
- 51.445 Labour Relations in the Public Service
- 51.450 Canadian Constitutional Law
- 51.555 Advanced Administrative Law Problems

Political Science

- 47.540 Analysis of Canadian Public Policy and Administration
- 47.544 Public Administration in Developed Western Countries
- 47.545 Public Administration in Developing Countries
- 47.547 Decision Theories and Policy Studies
- 47.508 The Politics of Energy and the Environment
- 47.561 Canadian Foreign Policy
- 47.500 Canadian Local Government and Politics
- 47.501 Canadian Provincial Government and Politics

International Affairs

- 46.500 International Integration
- 46.510 Canada's International Policies
- 46.525 International Monetary Institutions
- 46.530 The International Enterprise
- 46.531 Science, Technology and International Affairs — Analytical Approaches

Management Studies

- 42.518 Marketing for Non-Profit Organizations

Social Work

- 52.511 Social Policy Analysis
- 52.541 Management of Social Programs
- 52.551 Program Evaluation
- 52.514 Housing Policy
- 52.525 Poverty and Wealth
- 52.540 Social Administration and Policy

Sociology and Anthropology

- 53.526 Sociology of Occupations and Professions
- 53.527 Sociology of Formal Organizations
- 53.529 Sociology of Science and Technology
- 53.530 Social Institutions I: Economics and Society
- 53.531 Social Institutions II: Labour Process
- 53.540 Political Sociology

*This is not a complete list of all the acceptable options. Students should contact the supervisor of graduate studies or the director for approval if there are other courses they wish to take which are not on this list.

University of Ottawa

- MSG 6131 Quantitative Models for Manpower Planning
 MSG 6317 Human Resources Policy
 MSG 6161 Topics in Behavioural Sciences
 MSG 6103 Managerial Accounting II
 MSG 6115 Advanced Managerial Economics
 MSG 5106 Management Science I
 MSG 5116 Management Science II
 MSG 6113 Decision Theory
 MSG 5109 Marketing
 MSG 6109 Marketing Research

Academic Standing

All candidates are required to obtain a grade of B- or better in each course in the program. A candidate may, with the recommendation of the school and the approval of the Faculty of Graduate Studies and Research, be allowed a grade of C+ in one half-course.

Compulsory Courses*

- Administration 50.500F1
Public-Sector Managing and the Canadian Political System
An examination of the central features and influences of the Canadian political system on public service managerial and policy roles. An examination of the application of managerial concepts and approaches in Canadian public administration.
Prerequisite: Political Science 47.200.
V.S. Wilson, Michael Prince and D.G. Swartz.
- Administration 50.510F1
Management Accounting
An introduction to the underlying assumptions and basic principles of accounting, and an examination of the uses of accounting information by management. Topics include income measurement, asset valuation, financial statement analysis,

*F,W,S indicates term of offering.
 Courses offered in the fall and winter (or any other two terms) will be followed by T.

The number following the letter indicates the credit weight of the course: 1 denotes a half-course credit, 2 denotes a full-course credit, etc.

cost systems, control reports, operating budgets, capital expenditure decisions, and alternative choice problems.

Robert Beshara.

- Administration 50.511W1
Financial Management
An examination of the principles and practice of financial planning and control. Analysis of the problems of resource allocation and asset management under conditions of uncertainty. Techniques of capital expenditure analysis, and analysis of funds flow.

Prerequisite: Administration 50.510 or permission of the school.

A.J. Bailetti and Michael Joyce.

- Administration 50.522W1
Economics for Management and Policy II
An examination of the concepts and uses of macroeconomic theory and methods in total social resource allocation, including fiscal and monetary policy.
Prerequisite: Economics 43.101.
Stanley Winer and George Warskett.

- Administration 50.523F1
Economics for Management and Policy I
An examination of the concepts and uses of microeconomic theory and methods in organizational resource allocation.
Prerequisite: Economics 43.101.
George Warskett, Stanley Winer and W.P. Hettich.

- Administration 50.530W1
Organizational Behaviour I
An examination of basic theories and approaches to the motivation of workers in organizations, the analysis of individual behaviour in organizations from the perspective of worker motivations, and the examination of current tools such as job enlargement participation models and M.B.O. for improving worker motivation and coping with organizational change.
D.G. Swartz, V.S. Wilson and Michael Prince.

- Administration 50.536F1
Law of Public Authorities I
Introduction to basic legal principles, structures and processes for the public administrator. Character of law and public law; constitutional framework; legal sanctions and basic principles of

legal control. Statutory discretion from the administrator's point of view.

R.D. Abbott and Scott McLean.

- Administration 50.550T2

Quantitative Methods

An introduction to the theory of measurement and various methods of data collection and causal analysis. Under the guidance of the instructors, students are expected to devise their own research designs, and analyze empirical data with the use of the computer.

Eugene Swimmer and Sharon Sutherland.

- Administration 50.567F1

Public Sector - Private Sector Relations

An examination of basic theories and interpretations regarding the roles of, and interrelationships among the state, corporations, labour unions, the professions and other elements of the private sector.

Prerequisite: Administration 50.500.

Rianne Mahon, G.B. Doern and Sharon Sutherland.

- Administration 50.568F1

Policy and Decision Making

An introduction to major political, economic and organizational theories of policy and decision making and their relationship to applied policy analysis.

G.B. Doern, Rianne Mahon and R.J. Van Loon.

Optional Courses

- Administration 50.501T2

Policy and Administration in Intergovernmental Relations

An examination of the major cost-sharing and fiscal transfer agreements, and the intergovernmental mechanisms for policy and administrative co-ordination. Also examined are selected substantive program areas such as immigration, cable television, manpower training, regional economic development, energy and natural resources, and other contemporary topics.

V.S. Wilson.

- Administration 50.502F1

The Political Economy of Regulation

An examination of political, economic, legal and

organizational theories of regulation in the Canadian and comparative context, and of the processes and consequences of regulatory practice in selected Canadian public policy fields.

G.B. Doern.

- Administration 50.512T2

Management Information Systems

An examination of information and decision networks of complex organizations, including general systems theory and information theory concepts, decision models and specifications of information requirements, systems analysis and sub-system modules, and hardware and software considerations.

Peter Nador.

- Administration 50.513W1

Public Decision Making and Budgeting

An applied examination of decision theories to budgeting and expenditure decisions. The focus is on analysis of actual federal, provincial and agency budgets viewed as outcomes of the decision process.

Stanley Winer.

- Administration 50.514W1

Public-Sector Accounting and Finance

An examination of selected problems in accounting and financial management in public-sector organizations.

- Administration 50.515F1

Management in the Public Service

An examination through cases and research of selected problems and issues in public service management. The specific focus of the course will change each year; some topics include human resources management, government investment and pricing decisions.

- Administration 50.516W1

Urban and Local Government Management

An analysis of the principal issues and processes of Canadian urban and local government management and administration.

Michael Prince.

- Administration 50.517W1

Public Management in Developing Countries

An applied analysis of selected issues in public management and administration in developing countries.

- Administration 50.519W1

Management of Public Enterprise

An examination of the theory and practice of public enterprise, drawing on both Canadian and comparative experience. The seminar examines selected federal and provincial crown corporations and mixed enterprises such as Air Canada, CNR, AECL, Telesat Canada and the Canada Development Corporation.

- Administration 50.520F1

Public-Sector Investment and Pricing

An examination of theory and practice related to decision making about public-sector investment and pricing policy, particularly in connection with large-scale projects and programs. Focus is on applied cost-benefit analysis (discount rates, marginal cost and shadow pricing and the handling of risk and uncertainty) in large-scale public investment choices.

- Administration 50.531W1

Organizational Behaviour II

An examination of macro open-systems theories of behaviour of organizations, including inter-agency and agency-clientele relations and accountability processes. Students examine through research papers different modes of organization, including ministry systems, state enterprise, mixed enterprise, regulatory boards and service and custodial organizations.

- Administration 50.537F1

Law of Public Authorities II

Characteristics and problems of control of administrative action. Varieties of legal control, judicial review, discretion, privative provisions and damages, appellate control, statutory reform.

- Administration 50.538W1

The Management of Provincial Government

A comparative analysis of public-sector management structures and processes at the provincial level of government. Topics examined include personnel and financial systems, regional administration, public utilities, direct interprovincial program and project management, and international activities of provinces.

- Administration 50.562W1

Planning and Evaluation in Government I

An examination of selected concepts, issues and

processes in applied governmental planning and evaluation, utilizing both Canadian and comparative experiences.

- Administration 50.563F1

Program Assessment Design

An application of appropriate evaluative concepts to a public program or project in a bureaucratic setting. Working closely with the instructor, the student will design a feasible study/review of a program or project. Additional training in suitable methodologies will be acquired. The number of students will be limited to the number of appropriate programs/projects in co-operating government departments available in any one year.

Prerequisite: Administration 50.562.

Sharon Sutherland.

- Administration 50.565T2

Government-Industry Policy Relations

An examination of the main policies, programs and strategies of those government departments (federal and provincial) which have the most direct interface with the industrial and corporate sector in Canada. These departments include Industry, Trade and Commerce, Treasury and Economics, Consumer and Corporate Affairs, etc. George Warskett and Rianne Mahon.

- Administration 50.566S1

Science and Technology Policies

An examination of Canadian programs, policies and strategies toward the development of scientific and technological capability and towards the use of science and technology in social and economic programs.

- Administration 50.569W1

Advanced Policy and Decision Analysis

Advanced critical analysis of organizational, political and economic theories of public-sector decision making, including the choice of policy instruments, collective action, constitutional and institutional design.

Stanley Winer.

- Administration 50.572F1, W1, 50.573S1

Policy Seminars

An examination of one or more selected policy areas. The focus will be an analytical assessment of the selected policy area in terms of its many-sided economic, political, social, legal, quantitative

and administrative complexities. The policy field will change each year.

Sharon Sutherland, D.G. Swartz, George Warskett and V.S. Wilson.

- Administration 50.574F1

Urban Policy Analysis

An analysis of the urban policies of all three levels of government in Canada and their interactions.

The course examines policy processes as well as a number of substantive urban policy issues.

A.M. Maslove.

- Administration 50.575F1

Advanced Statistical Policy Analysis

An examination of econometric research on selected policy issues. The issues considered vary each year and the analysis incorporates the study of selected econometric techniques. The course enables students to evaluate critically applied econometric studies of public policy.

Stanley Winer.

- Administration 50.581W1

Staffing and Personnel Management

An examination of the staff and personnel-management functions in large public and private organizations, including recruitment, selection, and performance appraisal, reward systems, and the roles of staffing professionals.

Kenneth Cox and Peter Rainboth.

- Administration 50.583F1

Problems in Organizational Change and Development

An examination, through case work and group projects, of the concepts and issues of planned organizational changes.

- Administration 50.584F1

Industrial Relations and Collective Bargaining

An analysis of the basic concepts of industrial relations with respect to both public- and private-sector employees and organizations.

Eugene Swimmer.

- Administration 50.585W1

Public-Sector Collective Bargaining

An application of the basic concepts, legislation and public policies regarding public-sector collective bargaining at the federal, provincial and

municipal levels of Canadian government. Cases and simulated negotiations will be used where appropriate.

Prerequisite: Administration 50.584 or permission of the school.

Eugene Swimmer.

- Administration 50.590T2

Directed Studies

A tutorial or directed reading course on selected subjects.

- Administration 50.591F1, W1, S1

Directed Studies

A tutorial or directed reading course on selected subjects.

- Administration 50.598F2, W2, S2

Research Essay

- Administration 50.599F4, W4, S4

M.A. Thesis

The School

Director of the School: Glenn Drover

Supervisor of Graduate Studies: Arthur Stinson

The School of Social Work offers a graduate program leading to the degree of Master of Social Work. The program may be completed through full-time or part-time study.

Master of Social Work

The Master of Social Work program is based on an analytical and critical approach to social work practice and to knowledge related to practice. The program examines the structural context of personal and social problems, and of social work practice. The structural context refers to the interaction between the personal and the social, political, and economic aspects of such problems. The program focuses on the development of forms of practice predicated on this notion, referred to as structural approaches, seeking to intervene to change the nature of the interaction between people and their structural context.

The school's orientation explicitly includes approaches to social problem solving, social development and social change, which involves working directly with individuals and groups. This includes a strong emphasis on sensitivity to the individual, and on the development of new and innovative strategies for working with individuals in their environments. The school also stresses community analysis and an awareness and knowledge of the social policies that affect the lives of many people in our society.

The program of the school offers two major social work intervention areas. The first area is related to direct practice with individuals, families, groups and communities. Pressures of society are contributing to the toll of family and individual suffering. Traditional primary institutions such as the family are undergoing modification, and in many cases they no longer provide needed support. It is hoped that skilled social work practitioners can help families, individuals, and communities through some of the crises, and help them effec-

tively to address the personal and societal pressures they are facing.

The second major area of study is social administration and policy. There is a growing awareness that social work should be more involved in the development of social policies, in the operation of large scale social programs, and in policy analysis and research. Since the school is well situated in the nation's capital, it has a wealth of resources in the social policy and program arenas to draw upon.

The program includes the following major curriculum segments:

- An understanding of social structure and individual and collective behaviour
- An understanding of the methods and processes of social work intervention
- An understanding of the social policy process and social work's participation in it
- Research knowledge and skills and their application to questions dealing with social work practice, with particular emphasis on the evaluation of social work practice and of programs
- Field work, an opportunity for students to test out aspects of the academic curriculum within a practice setting, and to work with professionals involved in social work and related fields.

Part-Time Degree Program

The school also has a small part-time degree program in operation. A limited number of candidates are admitted to this program each fall. It is anticipated that the part-time program will attract competent candidates who, due to a range of circumstances, cannot participate in a program of full-time study. M.S.W. requirements in the part-time program are identical to the regular program, and the course offerings and timetable for part-time students are the same as for full-time students. Part-time students are permitted to enrol in a maximum of two half-courses per term.

Admission Requirements

Admission to the school is on a selective basis.

All applicants will have received their Bachelor's degree, or be in their final year of undergraduate study prior to graduating from a recognized university; a minimum B standing at the undergraduate level is expected. Applicants must present a one-credit course in basic research methods and

should have a background in the social sciences. Preference will be given to candidates with related work experience.

Applicants with a B.S.W. degree, or graduate work in a related discipline, are considered individually for advanced standing in the program.

Application is made on the forms available from the Admissions Office at the School of Social Work; all applications should be received at the school by *February 1*.

Social Science Requirement

Applicants with degrees in the humanities or related fields may be required to take make-up courses in the social sciences. Courses that address societal and personal issues will be considered as equivalent: for example, society, value and technology; social and political philosophy; social history of Canada; contemporary Canadian cultures; media and society; public issues in Canada; and contemporary labour problems.

Research Requirements

Courses stressing logic of inquiry will be given preference. These may include courses in quantitative and/or qualitative research, philosophical as well as historical approaches to inquiry, and the standard social science research courses.

Program Requirements

Candidates for the Master of Social Work degree must complete 10 full credits of course work (or the equivalent).

All students must complete the courses 52.500, 52.510, either 52.551 or 52.552 (or one of the specified substitutes below), 52.561 (following the completion of four full credits taken in the school, which must include 52.500, 52.510, and either 52.520 or S.W. 52.540, or a substitution if advanced standing for any of these is granted) and 52.590.

Electives across the program, totalling 3½ credits, are to be accomplished through either a second (2 credit) field placement and the equivalent of 1½ credits of course work or 3½ credits of optional course work from across the program.

In addition, *Direct Intervention* students must take 52.520 and two half-credits from 52.501 to 52.509, 52.521 to 52.529; and *Social Administration and Policy* students must take 52.540 and two

half-credits from 52.501 to 52.509, 52.511 to 52.519, 52.541, 52.542.

Substitutes for 52.551 or 52.552 are: Sociology 53.512, and 53.513: Statistical Methods I and II; Anthropology 54.541: Anthropological Methods; Public Administration 50.550: Quantitative Methods; Public Administration 50.562, and 50.563: Planning and Evaluation in Government I and II; Psychology 49.510 and 49.511: Research Methods in Social Psychology I and II; Psychology 49.545: Quantitative Psychology; Psychology 49.570: Research Methods in Learning; Political Science 47.570: Advanced Research Methods; Economics 43.505: Econometrics; Economics 43.592: Empirical Methods; and History 24.588: Historiography.

All students must complete the courses 52.500, 52.510, either 52.551 or 52.552 (or one of the specified substitutes below), 52.561 (following the completion of four full credits taken in the school, which must include 52.500, 52.510, and either 52.520 or S.W. 52.540, or a substitution if advanced standing for any of these is granted, and 52.590.

Electives across the program, totalling 3½ credits, are to be accomplished through either a second (2 credit) field placement and the equivalent of 1½ credits of course work or 3½ credits of optional course work from across the program.

In addition, *Direct Intervention* students must take 52.520 and two half-credits from 52.501 to 52.509, 52.521 to 52.529; and *Social Administration and Policy* students must take 52.540 and two half-credits from 52.501 to 52.509, 52.511 to 52.519, 52.541, 52.542.

Substitutes for 52.551 or 52.552 are: Sociology 53.512, and 53.513: Statistical Methods I and II; Anthropology 54.541: Anthropological Methods; Public Administration 50.550: Quantitative Methods; Public Administration 50.562, and 50.563: Planning and Evaluation in Government I and II; Psychology 49.510 and 49.511: Research Methods in Social Psychology I and II; Psychology 49.545: Quantitative Psychology; Psychology 49.570: Research Methods in Learning; Political Science 47.570: Advanced Research Methods; Economics 43.505: Econometrics; Economics 43.592: Empirical Methods; and History 24.588: Historiography.

Academic Standing

The school operates within the evaluation and grading system of the Faculty of Graduate Studies and Research.

Graduate Courses*

Human Behaviour and Structural Context

- Social Work 52.500F1

Human Behaviour and Structural Context

A general framework for the utilization of social science theory in social work practice is presented, reviewing major contributions from individual and social psychology and from social, political and economic theory toward the understanding of the interaction between the personal and the larger social system aspects of problems confronted by social work practitioners.

- Social Work 52.501F1

Community Structure

Examination of various theories of community behaviour and structure, developing a general framework for understanding the complexity of community behaviour, related to community practice.

- Social Work 52.502W1

Economics of Welfare

An examination of economic aspects of social policy, critically examining several theoretical approaches to the role of government in the financing of social policy. Review of the growth of federal government spending on social welfare, and an examination of the federal tax system and selected social welfare policies.

- Social Work 52.503W1

Foundations of Sexuality

A critical examination of psychological, social psychological, and sociological theories about the nature of human sexuality, and sexual identity and interaction.

*F,W,S indicates term of offering.

Courses offered in the fall *and* winter (or any other two terms) will be followed by T.

The number following the letter indicates the credit weight of the course: 1 denotes a half-course credit, 2 denotes a full-course credit, etc.

- Social Work 52.504F1

Social Work and the Law

Examination of the legal context within which social policy is developed, social programs presented, and social work practised, clarifying the philosophical basis of Canadian law, the relationship between law and the state, and the expression of the law in the judicial system. Special attention is given to a critical analysis of legislation concerning families and children.

- Social Work 52.505W1

Organizational Behaviour

Examination of contemporary theories and research related to organizational behaviour and change, focused on bureaucratic and open systems theory towards the critical analysis of complex social organizations, and examining the relevance of such theory to organizations in the social welfare field.

- Social Work 52.506F1

Women and Welfare

This course is designed to create general awareness of the changing status of women in Canada, with particular reference to women in social welfare programs, and to the practice of social work, examining how women have been perceived by the social sciences, the societal perception of women implied in social welfare policies, and the social change impact of the contemporary women's movement.

- Social Work 52.507F1

Foundations of Direct Intervention Practice

This seminar traces the philosophical and historical evolution of the competing paradigms underlying contemporary social work practice, with individuals, families and collectivities. Most of the analytical content will be drawn from the philosophy of science and from the sociology of knowledge.

- Social Work 52.508W1

Social Deviance and Social Control

A consideration of classical and contemporary theories of deviance, elucidating the nature and theoretical bases of ideas about social problems which are of concern to social workers.

- Social Work 52.509F1, W1

Selected Topics in Human Behaviour

Seminar on a special topic, presented by a faculty

member or a visiting professor. The seminar is based on current interests of faculty and students and availability of special expertise.

Social Policy Analysis

- Social Work 52.510W1

History and Philosophy of Social Welfare

An historical perspective on the development of social welfare policies and the practice of social work, presenting an analysis of such matters as the functions of welfare institutions, the historical relationships between welfare and work, the nature and terms of social provisions, the contrast between residual and institutional welfare policies, and the development of social work practice.

- Social Work 52.511F1

Social Policy Analysis

Based on a framework for the analysis of social problems, the course offers conceptual, theoretical and empirical tools for the analysis of social policies in meeting social needs or resolving social problems in Canadian society.

- Social Work 52.513F1

Personal Social Services

Examination of a number of issues related to personal social services, including government jurisdiction, financing, access, rationing, present organizational structures and the nature of services provided. Major current developments are examined, and a perspective on the future of personal social services developed.

- Social Work 52.514F1

Housing Policy

An introductory analysis of the economic and social aspects of housing. Issues include the nature of property, housing finance and construction, rent control, land assembly and development, and housing rehabilitation; also covers the genesis and current state of housing policy at all three levels of government, and the effect of government policy on the distribution of housing.

- Social Work 52.515F1

Poverty and Wealth

Critical examination of theories of poverty and wealth, in an attempt to explain the existence of poverty and the unequal distribution of income and wealth in Canada, then using the perspective developed to focus on existing and prospective

Canadian social policies, such as guaranteed annual income schemes and wealth taxation.

- Social Work 52.516W1

Mental Health Policies

An examination of the major issues and questions faced by practitioners, researchers, and planners in considering public policy decisions in the mental health field, including issues of authority and equality, values and political aspects.

- Social Work 52.517W1

Social Policies for Children

A critical examination of social policies in Canada specifically directed towards children, and their underlying social bases in relation to the economic system, the family, and child-rearing practices.

- Social Work 52.518W1

Seminar on a Selected Service Field

In any one year, two additional half-credit social policy analysis courses may be offered, focusing on particular fields of service, such as corrections, mental health services, children's services, or health care services, examining current programs, historical developments, and the major current issues or developments.

- Social Work 52.519F1, W1

Seminar on a Selected Service Field (Same description as 52.518)

Direct Intervention

- Social Work 52.520F2

Direct Intervention

Presentation of a structural framework for social work practice, consonant with the changing paradigm underlying the profession over the past decade, articulating a model of practice, and examining the following aspects of the framework: assessment and interventive approaches; development of analytical and interactional skills; the helping process. Research questions and implications will be continually identified.

- Social Work 52.521W1

Individual and Family Intervention

The development of practice knowledge and skill related specifically to intervention with individuals and with families, examining the implications for assessment and intervention of a structural approach to working with individuals and families,

and directing attention to the differential use of current techniques of intervention.

Prerequisite: Social Work 52.520.

- Social Work 52.522F1

Models of Practice with Individuals and Families
Comparative and critical analysis of contemporary models, that is, "approaches", "intervention methodologies", etc., currently proposed in direct practice. An analytical framework is presented which examines the problems of selection and relevance of such models for a structural approach to practice.

- Social Work 52.523F1

Principles of Group Development

Group development refers to the changes through time in the internal structures, processes, and culture of the group. Based on the assumption that the group is a vehicle in all practice modalities, and that the role of the group leader is that of developing the group to do its own work, the course draws on small group theory and group practice theory.

- Social Work 52.524W1

Differential Application of Group Development
Examination of the application of group development skills in a variety of settings, with the concept of group development as a unifying theme; identifying significant interactional variables to form a comparative framework. The student will acquire knowledge in breadth, pertaining to the differentiation of group contexts, as well as knowledge in depth, pertaining to a selected group context.

Prerequisite: Social Work 52.523 or equivalent.

- Social Work 52.525W1

Building an Organization

The theory and practice of organizing for social action in a variety of contexts: at the theoretical level, the concern will be when and on what basis to organize. Specific attention is then given to organizing at the community and the institutional levels, and organizing national pressure groups around social policy issues. The development of skills in contacting the potential constituency, in constitution-making and running meetings, negotiating, fund raising, public relations, building support among members, and planning effective actions to achieve or publicize organizational aims will be undertaken.

- Social Work 52.526W1

Models of Community Practice

Presentation of a framework for analysis of community problem definition, and working this through goal setting, decision making, action strategies, tactics and evaluation, affording a detailed examination of four major community intervention roles: enabler, organizer, developer, and advocate. The concept of citizen participation is also examined.

- Social Work 52.527F1

Case Studies in Community Practice

Concerned with community action in Canada, based on case studies of Canadian experiences, and providing a broad perspective of the types of citizen action and intervention in community processes; emphasis will be placed on practice, relating concepts developed to the past, present, and emerging reality of community work in Canada.

- Social Work 52.528W1

Feminist Counselling

A critical examination and analysis of approaches to women's problems by the helping professions in general, and social workers in particular, emphasizing the developing theory, practice and literature of feminist counselling which endeavours to combine the personal and political aspects of women's experiences and alternative forms of helping.

- Social Work 52.529W1

Legal Interventions with Children and Youth

Examines preventative and protective social work intervention with children and youth, analyzing the problems involved in neglect, violence and abuse, crisis situations, wardship, "taking-into-care", and problematic behaviours, in the context of the epigenetic stages of maturation, the family in its diverse forms, and the social-political context in Canada.

- Social Work 52.530W1

Social Change and Social Welfare

Exploration and analysis of the major factors in social change, drawing on the relevant work of major social theorists, and on writers such as Gorz, Alinsky and Freire, who have directed themselves more explicitly to issues faced by social workers.

Social Administration and Policy

- Social Work 52.540F2

Social Administration and Policy

An introductory methods course providing an understanding of the values and knowledge required for the effective performance of policy and planning roles in organizational and community settings, covering need assessment as well as administrative, policy and planning methods, with an emphasis on social welfare and health agencies as the system context for practice.

- Social Work 52.541W1

Management of Social Programs

Development of intervention and analytic skills through concern with the nature of management in the public and voluntary sector, approaches to more effective utilization of organizations and more effective mechanisms for the delivery of human services. Topics include managerial effectiveness, decision-making methods and tools, models of managerial behaviour, and the design of resource requirements, including budget development.

Prerequisite: Social Work 52.540.

- Social Work 52.542W1

Multi-Level Policy Intervention

To ensure that students have a comprehensive understanding of the uses of social system theory in social problem analysis and solution, students are introduced to large-scale social system analysis, macro-level decision theory, indicators of social system status and structural level research processes and findings; acquaints students with notions of system balance, system contexts for policy development and problem solving, and multiple-level policy options and intervention.

Prerequisite: Social Work 52.540.

- Social Work 52.543W1

Supervision of Direct Practice

An analysis of the functions performed in the supervisory role in human service organizations, consideration of differential models of supervision, and examination of problems and issues in social work supervision.

- Social Work 52.544F1

Program Implementation Analysis

An examination of factors affecting social program

implementation, and issues pertaining to the translation of policies and plans into program realities.

- Social Work 52.549F1, W1

Special Seminar in Social Work Intervention

A special half-credit seminar in intervention may be offered each year, on a particular topic relevant to current interests of faculty and students (or a visiting professor), in either Direct Intervention or Social Administration and Policy.

- Social Work 52.551W1

Program Evaluation

Relying on principles of basic research methods, this course will focus on the issues of planning and conducting research which aims to determine the effects of social programs. Topics include purposes of evaluative research, articulating program components, goal specification, development of measures, experimental and quasi-experimental design, and utilization of findings.

- Social Work 52.552W1

Evaluation of Direct Intervention

Development of a beginning awareness of issues and skills involved in the evaluation of intervention with individuals, families, small groups, and communities. Moving from philosophical and socio-political research perspectives, the seminar focuses on the development of evaluative criteria and analytical frameworks which could be used to determine the relevance and the effectiveness of intervention.

Field Practice — Full-Time

- Social Work 52.561F4, W4, S4

Field Practice I

The field placement facilitates the integration of the academic and practical aspects of social work education, providing the opportunity for students to test theory and practice models dealt with in the academic curriculum, and to learn professional responsibility in self-directed learning practice skills; includes a bi-weekly field seminar. Offered in spring term subject to availability of faculty.

- Social Work 52.562F4, W4, S4

Field Practice II

(Same description as 52.561)

Field Practice — Part-Time

- Social Work 52.563F2, W2, S2

Field Practice I

(Same description as 52.561)

- Social Work 53.564F2, W2, S2

Field Practice II

(Same description as 52.561)

Independent Enquiry Project

- Social Work 52.590F2, W2, S2

Independent Enquiry Project

The IEP is designed to contribute to the preparation of social work practitioners through the development of skills in planning and conducting research relevant to social work practice. The IEP should include some common elements: formulation of a question; a rationale for the importance of the question; theoretical basis for investigating the question. Various research approaches and styles may be used. The student works with a faculty research adviser and the proposal is reviewed by a project reader.

- Social Work 52.591F1, W1, S1

Tutorial on a Selected Topic

Tutorial or reading course on a selected topic.

Offered in spring term, subject to availability of faculty.

Courses Not Offered in 1981-82

52.550 Research Planning Seminar

Department of Sociology and Anthropology

The Department

Chairman of the Department: Gordon Irving

Departmental Supervisor of Graduate Studies:

John de Vries

Associate Supervisor of Graduate Studies:

Jacques Chevalier

The Department of Sociology and Anthropology offers programs of advanced study and research leading to the M.A. and Ph.D. degrees in Sociology, and to the M.A. in Anthropology.

The principal focus of departmental interest in sociology at the graduate level is comparative social organization, with complementary specialization in the study of social demography-ecology and theory-methodology. The research emphasis is on industrial and industrializing societies. The institutions of Canadian society, in particular, class, ethnic, political and regional structures, are examined in historical and comparative perspective.

The principal focus of the anthropology graduate program is the exploration of current developments in analysis and theory. This emphasis upon theory and methodology leads to the exploration of such alternative approaches to anthropological analysis as functionalism, Marxism, behaviourism, and structuralism, among others. There is a strong ethnographic component with particular emphasis on North American studies and a secondary emphasis on Africa.

The current activity of the members of the department is as follows:

Comparative Social Organization

Comparative Societies

Wallace Clement, John Harp, B.A. McFarlane, Dennis Olsen, Adam Podgorecki, A.D. Steeves, D.R. Whyte

Comparative Institutions

Wallace Clement, Colin Farmer, D.P. Forcese, Muni Frumhartz, John Harp, F.K. Hatt, Florence Hughes, Gordon Irving, John Myles, Adam Podgorecki, Stephen Richer, James Vantour, F.G. Vallee

Occupations and Formal Organizations

C.C. Gordon, D.P. Forcese, F.K. Hatt, Judah Matras, Hugh McRoberts, A.D. Steeves

Social Stratification and Mobility

Monica Boyd, Wallace Clement, D.P. Forcese, F.K. Hatt, Judah Matras, Hugh McRoberts, A.D. Steeves

Social Anthropology

Valda Blundell, J.J. Cove, B.A. Cox, Jared Keil, Charles Laughlin, Joseph Manyoni, J.I. Prattis, D.G. Smith, V.F. Valentine, F.G. Vallee

Social Demography-Ecology

Monica Boyd, Judah Matras, John de Vries

Theory-Methodology

Hyman Burshtyn, Jacques Chevalier, D.P. Forcese, B.D. Johnson, Hugh McRoberts, Gertrud Neuwirth, T.A. Nosanchuk, J.I. Prattis, John de Vries, Caryll Steffens, D.R. Whyte

The Department of Sociology and Anthropology has access to the Canadian Institute of Public Opinion poll data and the Human Relations Area Files, and is a member, in co-operation with other social science departments, of the Inter-University Consortium for Political Research. Other data sets and archival holdings are also available in the department. Because of the location in Ottawa of Statistics Canada, the National Museum, the National Library, the National Science Library, the Public Archives, and the headquarters of many government departments, the city is an excellent base of operations for sociological research.

The graduate program in anthropology enjoys an especially close relationship with the sociology graduate program and, while certain members of the department are primarily identified as anthropologists, a number of sociologists may also be called upon for particular contributions to the program. There are other valuable resources in the Norman Paterson School of International Affairs and the Committee on African Studies.

Qualifying Year Program

Applicants with general (pass) Bachelor's degrees may be admitted into a Qualifying Year program designed to raise their standing to Honours status.

Students earning at least high second-class standing in their Qualifying Year courses will be considered for admission into the Master's program.

Refer to the general section of this calendar for details of the regulations governing the Qualifying Year.

Master of Arts in Sociology

Admission Requirements

The requirement for admission into the Master's program is an Honours B.A. (or the equivalent) with at least high second-class standing.

Program Requirements

Master's students in sociology are required to select and follow one of the optional program patterns below, chosen in consultation with a graduate adviser:

Thesis Program

- Three full courses (or the equivalent); under certain circumstances one of the courses may be selected from those offered at the senior undergraduate level. 53.589 is highly recommended, especially for students who at the time of registration have not decided on a thesis topic.
- A thesis equivalent to two full course credits
- An oral examination on the candidate's thesis and program.

Course Work Program

- Five full courses (or the equivalent) excluding 53.595; under certain circumstances one of the courses may be selected from those offered at the senior undergraduate level.
- Written and oral examination in the candidate's area of specialization and program (53.595).

Academic Standing

A grade of B- or better must normally be obtained in each course counted toward the Master's degree. With the recommendation of the department, a candidate may be allowed a grade of C (but not C-) in one full course or each of two half-courses.

Master of Arts in Anthropology

Admission Requirements

The requirement for admission into the Master's program is an Honours B.A. (or the equivalent) with at least high second-class standing.

Program Requirements

Master's students in anthropology are required to select and follow one of the optional program patterns below, chosen in consultation with a graduate adviser:

Thesis Program

Three full courses (or the equivalent) to include:

- 54.541
- 54.542
- Two additional credits selected from the anthropology graduate course offerings; from courses offered in the sociology graduate program (especially in theory and methods); from 400-level courses offered in the sociology and anthropology undergraduate program (with permission of the graduate committee); or any combination of these selected in consultation with the student's graduate adviser. Courses in other programs in the University may also be selected (for example, Political Science 47.581), but not in excess of one full course (or the equivalent).
- A thesis equivalent to two full course credits
- An oral examination on the candidate's thesis and program.

Course Work Program

- Five full courses (or the equivalent) excluding 54.595, consisting of
- 54.541
- 54.542
- Four additional course credits as described in the thesis program above, chosen in consultation with the student's graduate adviser
- A written and oral comprehensive examination in the candidate's area of specialization and program (54.595).

Academic Standing

A grade of B- or better must normally be obtained in each course counted toward the Master's degree. With the recommendation of the depart-

ment, a candidate may be allowed a grade of C (but not C-) in one full course or each of two half-courses.

Doctor of Philosophy in Sociology

The substantive focus of the Ph.D. program is the organization and development of modern societies, both in a comparative context and with particular reference to Canadian society.

Admission Requirements

The minimum requirement for admission into the Ph.D. program is a Master's degree (or the equivalent) in sociology, normally with a minimum average of B+ in courses (including the thesis where applicable), and with no grade below B.

Applicants who have deficiencies in certain areas may be admitted into the Ph.D. program, but will normally be required to complete additional course work.

Program Requirements

The specific program requirements of the Department of Sociology and Anthropology are the following:

- 10 full courses (or the equivalent), including 53.600 and a thesis equivalent to a maximum of seven full courses or a minimum of five full courses
- Written and oral comprehensive examinations in three areas of specialization
- An oral examination on the subject of the thesis and fields related to the candidate's Ph.D. program.

Comprehensive Examinations

Each Ph.D. candidate is required to write a total of three comprehensive examinations. At least one (but not all) of the three examinations will be undertaken in a sub-area of comparative social organization: the sub-areas are comparative societies, comparative institutions, occupations and formal organizations, social stratification and mobility, and social anthropology.

The remaining comprehensive examinations must be undertaken in:

- social demography-ecology, and/or
- theory-methodology

An approved field in a related discipline may be substituted for one of the areas listed above.

The comprehensive examinations are normally undertaken after completion of at least one year of Ph.D. study, and must be successfully completed at least one term before the oral defence of the thesis.

Language Requirements

The Department of Sociology and Anthropology requires each Ph.D. candidate to demonstrate an understanding of a language other than English. Although French is the preferred second language, students may be permitted to substitute another language if it is demonstrably relevant to their professional interests. It is strongly advised, however, that all English-speaking candidates be proficient in French. The language requirements may be satisfied by a demonstration of reasonable understanding, on sight, of material contained in selected samples of the sociological literature in that language. Students may find it necessary or advisable to take a course in the required language before undertaking the departmental language examination.

Academic Standing

Candidates must obtain a grade of B- or better in each course and on the comprehensive examinations.

Graduate Courses*

- Sociology 53.500F1
Traditional Theory: Marx's Sociology
Marx's sociology and his theories of ideology, social class, social change (historical materialism), surplus value and political sociology.

* F, W, S indicates term of offering.
Courses offered in the fall *and* winter (or any other two terms) will be followed by T.

The number following the letter indicates the credit weight of the course: 1 denotes a half-course credit, 2 denotes a full-course credit, etc.

Credit will not be given for both Sociology 53.500 and Political Science 47.431.

D.R. Whyte.

- Sociology 53.501W1

Traditional Theory: Durkheim and Weber

Durkheim: the social division of labour and social evolution, the theoretical and methodological analysis of *Suicide*, the method of sociology, the science of morals and the sociology of religion. Weber: social action theory and interpretative sociology, the distinction between natural and cultural sciences, the theory of value, the construct of ideal type, the concept of rationality and the rationalization of life through secularization and bureaucratization.

Adam Podgorecki.

- Anthropology 54.504W1

Ecological Anthropology

An examination of selected theoretical, methodological, and substantive issues, both historical and contemporary, in ecological anthropology. Special emphasis is given to problems of systems analysis, the epistemological status of ecological data, and ecological explanation. Selected cases in North America and other ethnographic regions will be considered.

Valda Blundell.

- Sociology 53.507W1

Social Change and Economic Development

A critical examination of studies of change and development in historical and contemporary national and transnational systems.

D.R. Whyte.

- Anthropology 54.508F1

Structuralism

An examination of the structuralist perspective as employed in anthropological investigation, analysis, and explanation. Theoretical and methodological problems in structuralism are examined through a consideration of current issues in anthropology and through an examination of the several varieties of structuralism.

Jacques Chevalier.

- Sociology 53.512F1

Statistical Methods I

The focus will be research design and sampling designs. Various data-collecting methods will be

examined and the strengths and weaknesses of various sample designs will be considered. The basic foundations of statistical analysis will be laid.

John de Vries.

- Sociology 53.513W1

Statistical Methods II

The focus will be advanced research methods.

Topics will include distributions, sampling distributions, hypothesis testing, and non-parametric methods. There will be an introduction to multivariate techniques, including regression and log-linear models.

John de Vries.

- Sociology 53.515W1

Selected Topics in Social Research

An examination each year of a particular research method. This year the topic will be secondary data analysis.

John de Vries.

- Anthropology 54.516W1

Selected Topics in North American Native Studies

An anthropological examination of selected issues concerning traditional and modern Indian, Inuit, and Métis societies, with emphasis on the Canadian scene. The course will explore controversies surrounding social change, "modernization", and cultural autonomy. Debates over resource management, native rights, government policy, and women's status may be examined.

J.J. Cove.

- Sociology 53.522W1

Social Formations and Modes of Production

An anthropological analysis of theoretical, methodological and empirical issues in the study of economic systems. The course will include a discussion of recent developments in the discipline. Special attention will be given to pre-capitalist modes of production, theories of economic modernization and to the neo-Marxian study of modes of production and their articulation within various social formations.

J.I. Prattis.

- Sociology 53.525T2

Canadian Society

A critical examination of sociological models of modern societies and their relevance to Canada.

Special attention is given to current research and its application to contemporary issues.
Wallace Clement.

- Sociology 53.527W1

Sociology of Formal Organizations

A consideration of the forms and processes of bureaucracy in modern society, government and industry.

John Myles.

- Sociology 53.529F1

Sociology of Science and Technology

Study of the interaction among science, technology and change in modern societies.

B.A. McFarlane.

- Sociology 53.531F1

Social Institutions II

Topic for 1981-82: The Labour Process

A consideration of the organization of work and production from feudal times to the present.

The purpose of the course is to analyze the labour process in advanced capitalist societies by means of the historical comparative method.

Wallace Clement.

- Anthropology 54.541F1

Anthropological Methods

An examination of the philosophy of social science and the basic elements of scientific methods, with particular emphasis upon the problems of anthropological field work.

J.I. Prattis.

- Anthropology 54.542W1

Explanatory Frameworks in Anthropology

An examination of theoretical and methodological problems in anthropological analysis. Alternative approaches to explanation and analysis in anthropology will be considered. These may include Marxism, functionalism, behaviourism, and structuralism, among others, at both the micro and macro levels.

D.G. Smith.

- Sociology 53.545F1

Power and Stratification

An examination of theories of elite behaviour, social class and ideology.

Hugh McRoberts.

- Sociology 53.565F1

Demographic Analysis

A seminar devoted to the intensive study of analytical strategies and techniques employed in demographic research. Attention is also given to mathematical and statistical models used in demography, which are relevant to research in other areas of sociology.

Judah Matras.

- Sociology 53.583W1

Departmental Seminar: Modern Marxist Theory

Neo-Marxist analysis of the various institutional areas, including works on the family, state, education, and stratification.

Dennis Olsen.

- Sociology 53.585F1

Selected Topics in Sociology

Topic for 1981-82: Sociology of Language

A seminar in which the relation of language and the characteristics of societies and individuals will be explored. Special attention will be given to Canadian issues, such as second-language acquisition and bilingualism; language shift; and language rights and minority language survival.

John de Vries.

- Sociology 53.586W1

Selected Topics in Sociology

Topic for 1981-82: Deviance and Social Control

Florence Hughes.

- Anthropology 54.587F1

Selected Topics in Anthropology

Topic for 1981-82: Problems in North American Ethnohistory

This research seminar will examine methodological and substantive problems in the literature of North American ethnohistory, especially that of eastern Canada. It will explore controversies concerning the impact of European penetration and colonial policies on inter-tribal relations, cultural identity, and other aspects of native life.

Bruce Cox.

- Sociology 53.589T1

The Logic of the Research Process

An examination of the research process, including the phases of conceptualization, choice of indica-

tors, sampling, data collection, and analysis. Published articles will be studied as exemplars of the range of possible research strategies.

Stephen Richer and Hyman Burshdyn.

- Sociology 53.590F1, W1, S1
Tutorial

- Anthropology 54.590F1, W1, S1
Tutorial

- Sociology 53.595F1, W1, S1
Course Work Comprehensive in Sociology
Available for students in a course work M.A. who by the third term in their M.A. program have not yet completed their comprehensive and oral examinations. Completion of this course does not reduce the formal requirement of five full courses.

- Anthropology 54.595F1, W1, S1
Course Work Comprehensive in Anthropology
Available for students in a course work M.A. who by the third term in their M.A. program have not yet completed their comprehensive and oral examinations. Completion of this course does not reduce the formal requirement of five full courses.

- Sociology 53.599F4, W4, S4
M.A. Thesis

- Anthropology 54.599F4, W4, S4
M.A. Thesis

- Sociology 53.600T2
Doctoral Seminar

This course, an examination and review of the major areas of theory and research of departmental concern in the Ph.D. program, is required of all incoming Ph.D. students in their first year of residence. Other Ph.D. students still in residence are strongly urged to participate in this seminar. F.G. Vallee and D.R. Whyte.

- Sociology 53.690F1, W1, S1
Tutorial

- Sociology 53.699F, W, S
Ph.D. Thesis

Courses Not Offered in 1981-82

- 53.502 Social Behaviourism
- 53.503 Social Action
- 53.505 The Sociology of Knowledge
- 53.506 Economy and Society
- 53.509 Philosophy of Social Science I
- 53.510 Philosophy of Social Science II
- 53.514 Multivariate Analysis
- 53.517 Sub-Saharan African Ethnography
- 53.520 Comparative Social Systems
- 53.521 Comparative Methods in Social Research
- 53.523 Kinship Systems
- 53.526 Sociology of Occupations and Professions
- 53.530 Social Institutions I
- 53.534 Sociology of Law
- 53.535 Sociology of Religion
- 54.536 Symbolic Systems
- 54.539 Political Anthropology
- 53.540 Political Sociology
- 53.550 National Unity in Multi-Ethnic Societies
- 53.560 Human Ecology
- 53.566 Contemporary Socio-Demographic Problems
- 53.575 Macro-Sociological, Demographic, and Ecological Problems
- 53.601 Selected Topics in Sociology
- 53.602 Selected Topics in Sociology

Institute of Soviet and East European Studies

The Institute

Director of the Institute: C.H. McMillan

An interdepartmental committee was formed in 1963 to foster teaching, research, conferences and publications in Soviet and East European studies at Carleton. In 1970, a separate department — the Institute of Soviet and East European Studies — was established to administer the interdisciplinary programs developed by the committee. Faculty members from eight disciplines (economics, geography, history, law, political science, Russian, sociology and social psychology) participate regularly in the institute's activities. They are joined on an occasional basis by visiting scholars from outside the University, including invited specialists from the USSR and Eastern Europe.

At the undergraduate level, the institute offers an interdisciplinary B.A. Honours program in Soviet and East European Studies. The institute also administers a program of studies leading to a Master of Arts degree in Soviet and East European Studies, the only one of its kind in Canada. The curricula for both programs are offered largely through participating departments. The M.A. program is designed for students wishing to acquire specialized knowledge of the Soviet and East European area, including proficiency in the use of Russian as a research tool; the approach is interdisciplinary with emphasis on the social sciences and history. Students may take advantage of the University's regular academic exchanges with post-secondary institutions in Hungary, Poland and the USSR.

Qualifying Year Program

Applicants with a general (pass) Bachelor's degree in one of the disciplines represented in the program, or who lack sufficient area studies or language training, may be admitted to a Qualifying Year program designed to raise their status to that of Honours graduates in Soviet and East European studies. Students are expected to achieve second-

class standing in Qualifying Year courses in order to qualify for admission to the Master's year.

To be eligible for admission to the Qualifying Year program, an applicant must already have taken some courses in the area of Soviet and East European studies, so that by the end of the program he or she shall have satisfied the basic requirements for admission to the Master's program. While language training can be offered as part of the Qualifying Year program, students are expected to have completed the equivalent of an introductory course in Russian upon entry.

Master of Arts

Admission Requirements

The normal requirement for admission to the Master's program is an Honours degree (or the equivalent) in Soviet and East European studies, with at least high second-class standing.

Honours graduates in other disciplines are eligible for admission provided they meet the following requirements:

- A knowledge of the Russian language sufficient for its use in research; in exceptional cases the institute may permit the substitution of another Slavic or East European language.
- A total of seven full courses (or the equivalent) in the Soviet and East European field, taken in no fewer than three different departments
- At least high second-class standing.

Candidates with insufficient preparation in the Russian language or area studies may be admitted, but will be required to complete one or two additional courses. In some cases candidates may be required to enter the Qualifying Year.

Program Requirements

The specific requirements in the Master's program are the following:

- Soviet Studies 55.500 and 55.501, two half-course seminars in Soviet and East European studies, offered specially by the institute and incorporating the approaches of several relevant disciplines

- Two full courses, or the equivalent, chosen from the following list, with at least one full course (or the equivalent) at the 500 level. Students are advised to check with the relevant departments for final course listings for 1981-82, as changes in curricula may be made too late for inclusion below. Undergraduate course offerings below the 400-level may be taken by Qualifying Year students, and by students in the M.A. program as supplementary to the minimum M.A. course requirements. (See the institute's program description in the undergraduate calendar for a list of these course options.)

Economics

- 43.536 Comparative Economic Systems I
43.537 Comparative Economic Systems II

Geography

- 45.571 Selected Studies in the Human Geography of Arctic and Subarctic Lands

History

- 24.460 Selected Problems in Russian History
24.461 Selected Problems in Soviet History
24.560 Late Imperial and Revolutionary Russia
24.580 Problems in International History
24.589 Historiography (section dealing with modern Russia)

International Affairs

- 45.520 Strategy and Security
45.521 Strategy and Security
46.535 The Political Economy of East-West Relations
45.566 Integration in Eastern Europe

Law

- 51.420 International Economic Law II
51.421 International Economic Law III
51.488 Socialist Legal Systems

Political Science

- 47.431 Marxist Thought
47.432 Contemporary Communist Thought
47.461 Soviet Foreign Policy
47.462 International Communist Movement
47.514 Comparative Communist Politics: Theory and Practice
47.515 Comparative Communist Politics: Selected Aspects
47.516 Selected Problems in Soviet Politics

Russian

- 36.430 Russian Realism of the Nineteenth Century
36.440 Contemporary Russian Drama
36.450 Contemporary Russian Literature (after 1935)
36.460 Old Russian Literature
36.470 Modern Russian Literature
36.493 Translation Tutorial

Sociology

- 53.545 Power and Stratification
53.550 National Unity in Multi-Ethnic Societies
53.583 Marx and Neo-Marxists

Soviet Studies

- 55.590 Tutorial in Soviet Studies
55.591 Tutorial in Soviet Studies
55.592 Tutorial in Soviet Studies
55.593 Tutorial in East European Studies
55.594 Tutorial in East European Studies
55.595 Tutorial in East European Studies

- One of the following:

Soviet Studies 55.598, a research essay incorporating the approaches of at least two of the disciplines represented in the program; the research essay must be combined with an additional full course (or the equivalent) chosen from those listed above;

or

Soviet Studies 55.599, an M.A. thesis which must combine the interdisciplinary approach with a greater degree of originality than that required of the research essay, and which must be defended orally.

- An oral comprehensive examination to determine the candidate's general competence in the area and his or her ability to relate at least two disciplines to the study of the USSR and Eastern Europe.

In cases where, on admission, a student's command of the Russian language has been deemed insufficient, he or she may be required to pass an examination in Russian to English translation.

Candidates are encouraged to incorporate study at an educational institution in Eastern Europe or the Soviet Union into their degree program. They are also encouraged to take a tutorial in one East European language (other than Russian) offered by the Department of Russian.

Academic Standing

Master's candidates must obtain a grade of B- on all work counted for credit towards the degree.

Graduate Courses*

- Soviet Studies 55.500F1
Interdisciplinary Seminar on the Soviet Union and Eastern Europe
The themes of the seminar vary from year to year, but the continuing objective is to apply the approaches and methods of several relevant disciplines to selected issues and countries.

- Soviet Studies 55.501W1
Interdisciplinary Seminar on the Soviet Union and Eastern Europe
The themes of the seminar vary from year to year, but the continuing objective is to apply the approaches and methods of several relevant disciplines to selected issues and countries.

- Soviet Studies 55.590F1
Tutorial in Soviet Studies
A course of directed readings on selected aspects of the Soviet Union, involving preparation of papers as the basis for discussion with the tutor. Offered when no regular course offering meets a candidate's specific needs.

- Soviet Studies 55.591W1
Tutorial in Soviet Studies

- Soviet Studies 55.592S1
Tutorial in Soviet Studies

- Soviet Studies 55.593F1
Tutorial in East European Studies
A course of directed readings on selected aspects of Eastern Europe, involving preparation of papers as the basis for discussion with the tutor. Offered when no regular course offering meets a candidate's specific needs.

- Soviet Studies 55.594W1
Tutorial in East European Studies

- Soviet Studies 55.595S1
Tutorial in East European Studies

- Soviet Studies 55.598F2, W2, S2
Research Essay
A research essay on some topic relating to the Soviet Union or Eastern Europe.

- Soviet Studies 55.599F4, W4, S4
M.A. Thesis

*F, W, S indicates term of offering.

Courses offered in the fall *and* winter (or any other two terms) will be followed by T.

The number following the letter indicates the credit weight of the course: 1 denotes a half-course credit, 2 denotes a full-course credit, etc.

Chancellor

Gordon Robertson, B.A. Saskatchewan, B.A.
(Juris.) Oxford, M.A. Toronto, LL.D.
Saskatchewan, McGill, Toronto, Dalhousie,
D. d'Univ. Laval, F.R.S.C.

President and Vice-Chancellor

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David Stanford

John Yan

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To be announced

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The following list comprises those members of the faculty of Carleton University who offered graduate courses or supervised thesis research work during 1980-81 and those who are expected by their department to do so in 1981-82. Those whose names are accompanied by an asterisk are part-time, special or adjunct appointments.

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J.E. Neilson, B.Sc. Manitoba, Ph.D. British Columbia

Bernard Pagurek, M.A.Sc., Ph.D. Toronto

Irwin Reichstein, B.Sc. McGill, Ph.D. Minnesota

J.S. Riordon, M.Eng. McGill, D.I.C. Imperial, Ph.D. London

Eric Sigurdson, B.Sc. Manitoba, Ph.D. Imperial College

K.C. Toth, B.Eng., M.Eng., Ph.D. Carleton

C.M. Woodside, B.A.Sc. Toronto, Ph.D. Cambridge

Department of Systems and Computer Engineering

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John de Mercado*, M.Sc., Ph.D. Ottawa

H.I. El-Zorkany, B.Sc. Ain Shams, M.Sc.E., Ph.D. New Brunswick

David Falconer, B.A.Sc. Toronto, S.M., Ph.D. M.I.T.

Kamilo Feher*, Dipl. Eng. Zagreb, M.Sc.A. Montréal, Ph.D. Sherbrooke

The Institution

1941

The Ottawa Association for the Advancement of Learning was established to develop Carleton College. The next year the College offered only evening classes in introductory university subjects, with some courses in public administration.

1943

The incorporation of the Ottawa Association for the Advancement of Learning.

1945

Beginning of day classes and full-time teaching in arts, science, journalism, and first-year engineering. Establishment of the Faculty of Arts and the Faculty of Science.

1946

Move from rented premises to First Avenue campus, formerly Ottawa Ladies' College. First degrees awarded in journalism and public administration.

1947

The College committed itself to develop pass and four-year honours programs.

1949

First pass undergraduate degrees in arts, science, and commerce awarded. Formation of Senate.

1950

First honours degrees in arts and science awarded.

1952

The Carleton College Act, 1952 passed by the Ontario Legislature. This changed the corporate name to Carleton College and confirmed the power to grant degrees. Property for Rideau River campus acquired.

1953

Establishment of the School of Public Administration.

1954

Appointment of Architectural Associates for Carleton to prepare a master plan for Rideau River campus and to design the first group of buildings. First honorary degree of LL.D. conferred on Dag Hammarskjöld, Secretary-General of the United Nations.

1955

First Master of Arts degree awarded.

1957

The Carleton University Act, 1957. Establishment of the School of Engineering. Establishment of the Institute of Canadian Studies.

1958

First Master of Science degree awarded.

1959

Move to Rideau River campus, following construction of the Henry Marshall Tory Building (science), the Maxwell MacOdrum Library and Norman Paterson Hall (arts).

1961

First Ph.D. degree in science awarded. First degrees in engineering awarded.

1962

Southam Hall, the University Commons, Renfrew House and Lanark House (residences) completed. Norman Paterson Hall extended and University Union opened.

1963

First Master of Engineering degree awarded. Reorganization into Faculties of Arts, Engineering, Science, and Graduate Studies.

1964

The C.J. Mackenzie Building (engineering) completed.

1965

The E.W.R. Steacie Building (chemistry), Grenville House and Russell House (residences), Maintenance Building and Heating Plant completed.

1966

First Ph.D. degree in engineering awarded. The Physics Building completed (designated in 1972 as the Herzberg Laboratories). Establishment of the Schools of International Affairs and Commerce.

1967

Loeb Building (social sciences) completed. Integration of St. Patrick's College as a division of the Faculty of Arts. Integration of the School of Social Work.

1968

First Ph.D. degree in arts awarded. First Master of Social Work degree awarded. Establishment of the School of Architecture.

1969

Controlled Environmental Facility (Biology), Administration Building, Glengarry House (residence) and University Commons (residence cafeteria) completed.

1970

University Centre and Parking Garage completed.

1971

Arts Tower completed.

1972

Architecture Building completed. School of Social Work accommodated on the Rideau River campus.

1973

St. Patrick's College moves to new facility on the Rideau River campus. First degrees in architecture awarded. New athletic complex containing 50-metre pool and fitness centre opened. School of Industrial Design established.

1974

Faculty of Graduate Studies expanded into Faculty of Graduate Studies and Research. School of International Affairs renamed the Norman Paterson School of International Affairs. Master of Journalism program approved for September 1974. Master of Arts programs in Anthropology and in Religion approved for September 1975. Program leading to Certificate in Teaching of English as a Second Language established.

1975

Lester B. Pearson Chair for International Affairs approved for January 1, 1975. Establishment of Gerhard Herzberg Lecture Series in Science. First students enrol in public policy and management program offered jointly with the University of Ottawa.

1976

First Dunton Alumni Award presented, January 1976. Creation of the Paterson Centre in March 1976. Division of the Faculty of Arts into two separate faculties: the Faculty of Arts and the Faculty of Social Sciences, effective July 1976. First Master of Journalism degrees awarded, November 1976.

1977

Opening of the Criminology and Corrections Program at St. Patrick's College, April 1977.

1978

School of Continuing Education established. Credit courses offered on cable television for first time. Institute of Biochemistry established.

1979

St. Patrick's College ceased to operate as an academic unit of the University. Academic programs of the college continue as University programs, except for the Unified Liberal Arts Program.

1980

Establishment of the School of Computer Science. Establishment of the Chair of Office Automation in the Faculty of Engineering.

Presidents

1942—1947

Henry Marshall Tory

1947—1955

Murdoch Maxwell MacOdum

1955—1956

James Alexander Gibson (acting)

1956—1958

Claude Thomas Bissell

1958—1972

Arnold Davidson Dunton

1972—1978

Michael Kelway Oliver.

January 1—May 15, 1979

James Downey (*pro tempore*)

May 15, 1979—

William Edwin Beckel

Chancellors

1952—1954

Harry Stevenson Southam

1954—1968

Chalmers Jack Mackenzie

1969—1972

Lester Bowles Pearson

1973—1979

Gerhard Herzberg

1980—

Gordon Robertson

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